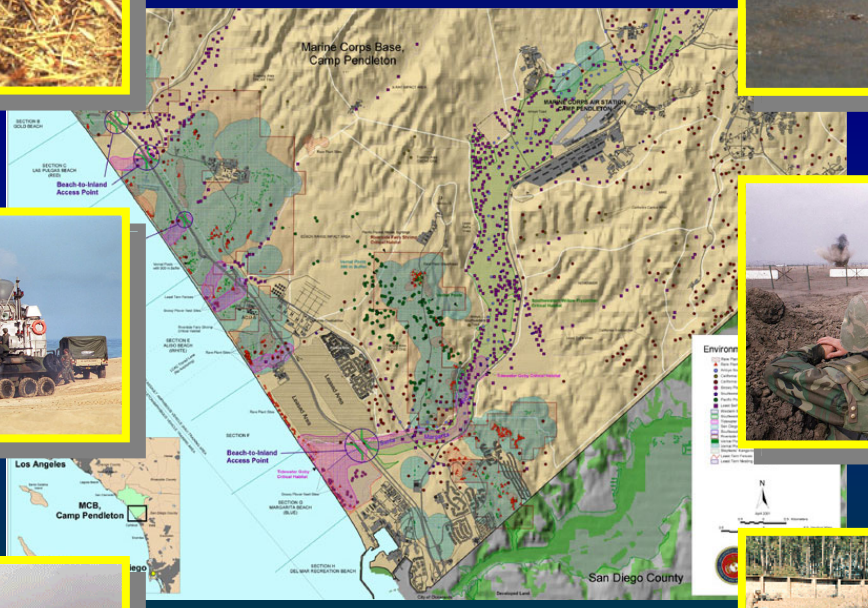
Encroachment Impacts on Training and Readiness at Marine Corps Base Camp Pendleton



Encroachment Impacts on Training and Readiness at Marine Corps Base Camp Pendleton

Prepared for:

Marine Corps Base Camp Pendleton

Assistant Chief of Staff
Environmental Security

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Prepared by:
SRS Technologies
1401 Wilson Boulevard, Suite 1200
Arlington, Virginia 22209

EXECUTIVE SUMMARY

Marine Corps Base, Camp Pendleton's mission is to provide ranges, training lands, and facilities on which Marines can train to achieve the highest state of combat readiness. Over time, and particularly in the past 10-15 years, the ability of Camp Pendleton to provide the training environment required to prepare Marines for combat has eroded significantly due to a variety of factors. Today, these factors, which are termed encroachment by the Department of Defense (DoD), present an immediate, serious challenge to the capability of the Base to perform its military mission. Encroachment is defined as any non-DoD action that has the potential to impede or interfere with Camp Pendleton's capability to perform its military mission. Encroachment factors with the potential to impede training include urban growth, competing land use, airspace restrictions, airborne noise, endangered species, cultural resources, wetlands, and air quality.

Marines who train at Camp Pendleton and the leaders at the Base who are responsible for providing the best possible training environment have observed that the Base's capability to provide realistic combat training has degraded due to encroachments. What has been lacking is a quantitative tool to examine and assess those observations by measuring the impacts of encroachments on training and readiness at Camp Pendleton. The purposes of this study are to: (1) develop that quantitative tool; and (2) assess and quantify impacts on the Base's mission capability from various categories of encroachment.

The following objectives were developed by the Base to guide this and any future quantification efforts. At a minimum, the assessment methods should:

- Capture the costs of encroachment, in terms of degradation in the mission capabilities of the Base.
- Apply to a representative cross-section of training requirements for Military Occupational Specialties (MOSs), units, and weapons systems that utilized the Base.
- Focus on the perspectives and experience of the operational forces (i.e., subject matter experts) that train on the Base.
- Identify the work-arounds that have been used to address training events impacted by encroachment and begin to develop a picture of the value of the Base as part of a regional complex of Marine Corps ranges and installations.
- Be capable of repeat application in a consistent manner in future assessments and have utility as an analytical tool that can be readily applied by operational commanders and training managers at intermediate command levels.

The focus of the assessment is on Marine Corps Base Camp Pendleton, rather than on any specific Marine Corps unit. The assessment does not analyze the readiness of individual Marines or units of Marine operating forces. It is concerned solely with the capability, or "readiness," of Camp Pendleton as a Base to provide a realistic training environment.

The scope of this initial assessment focused on several components of a Marine Expeditionary Unit (Special Operations Capable) (abbreviated "MEU" in this Report). The MEU is a task-organized force comprised of ground combat, air combat, combat support, and command and control elements. The MEU deploys from Camp Pendleton embarked on Navy amphibious ships

that comprise an Amphibious Ready Group (ARG). Pre-deployment training is designed to ensure that the MEU is prepared to perform a wide variety of missions. Consistent with Marine Corps training doctrine, MEU training builds on previously conducted individual and small unit training. Upon arrival at an area of operations, the MEU must disembark the ships and move ashore. This movement of Marines ashore can be accomplished via landing craft to a beach, helicopters or other aircraft from the sea to an inland objective, or both. A MEU is required to be trained and capable of executing both types of movement ashore. Therefore, pre-deployment training for the MEU culminates in complex amphibious exercises.

The mission of Camp Pendleton is to provide the training areas and ranges for the entire range of individual, small-unit, and large-unit combat training required to prepare Marines for combat. Accordingly, this assessment analyzes the impacts of encroachment on a cross-section of the military occupations, units, and types of equipment found in the MEU. The following chart depicts a notional MEU organization (figure A), highlighting the units or elements of combat power addressed in this study. The ground combat power of the MEU is embedded in the Battalion Landing Team (BLT), which consists of about 1,200 Marines. The study looks at the BLT as a unit, as well as several of the discrete building-block components of the BLT.

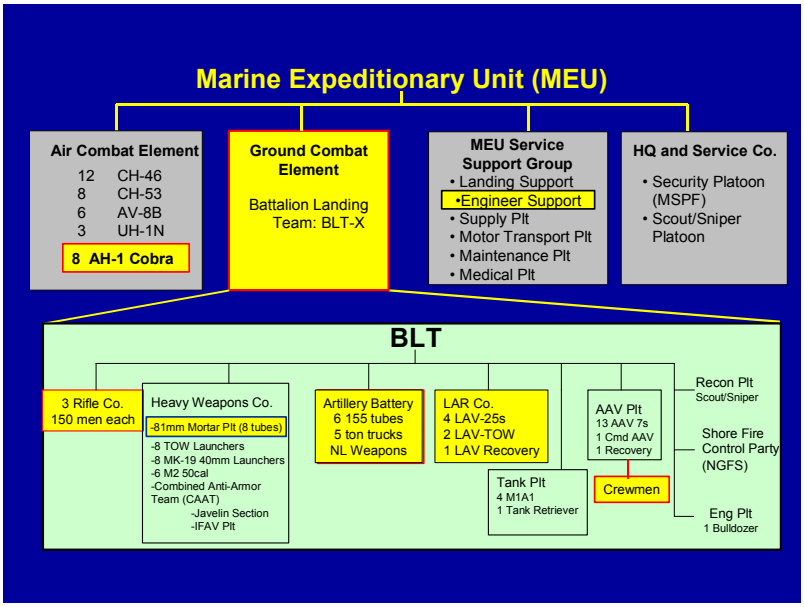

Figure A. Notional MEU Organization
(Study Units Highlighted)

The assessment of the capability of Camp Pendleton to support training was conducted at the training task level. The overall operation was broken down into tasks taken from existing Marine Corps Orders (MCO) as follows:

- Individual Training Standards (ITS) (MCO 1510 Series) for:
  - Mortarman
  - AAV Crewman
  - Combat Engineer

- Training and Readiness Manuals (MCO 3501 Series) for:
  - LAR Platoon
  - Artillery battery
  - AH-1W Cobra
- Marine Corps Combat Readiness Evaluation System (MCCRES) (MCO 3501 Series) for:
  - Rifle Company
  - MEU Battalion Landing Team

The data collection method used for this assessment was face-to-face interviews with Marine Corps subject matter experts (SME). The SMEs were Marines with a significant operational expertise, including training knowledge and experience at Camp Pendleton in the area being assessed. Their professional military judgment as to the ability to complete specific training tasks to Marine Corps standards at Camp Pendleton was the basis for the data and subsequent analysis.

Two training scenarios were selected for quantitative analysis of encroachment impacts. Optimal training replicates as closely as possible the conditions that might be encountered in a real-world operational context. The first scenario—a notional exercise—is intended to reflect the Base's requirement to provide a context for realistic, exercise-based training. The operational training scenario at Camp Pendleton selected for this quantitative analysis of encroachment impacts is a notional four-phase MEU exercise, depicted below in figure B.1, which involves:

- Phase 1: an amphibious landing of a Battalion Landing Team at Red Beach;
- Phase 2: tactical displacement of the BLT six miles through a maneuver corridor from Red Beach to an objective in the vicinity of the live-fire impact areas;
- Phase 3: deliberate assault of an enemy objective at the impact area; and
- Phase 4: the logistics sustainment of the combat forces.

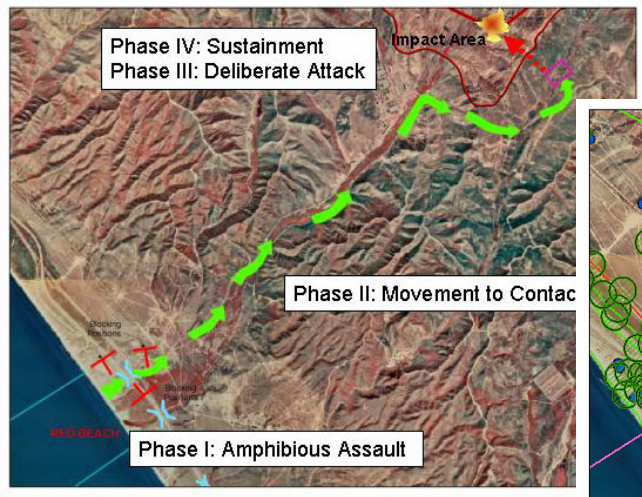

Figure B.1. BLT Operational Scenario

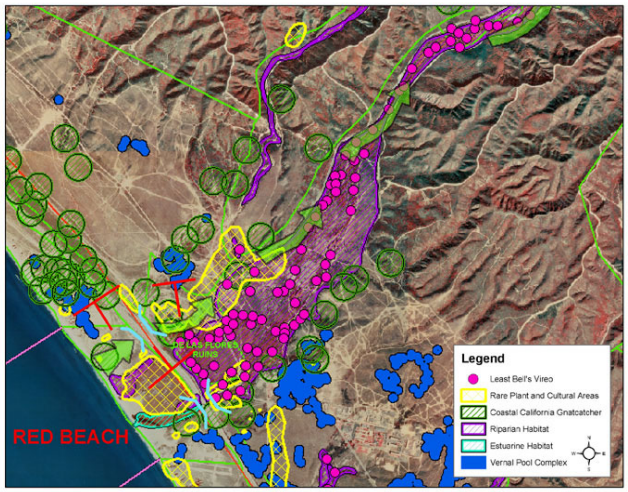

Figure B.2. Maneuver Corridor w/restrictions overlay

Figure B.2 depicts the movement corridor for the operational scenario overlaid with natural and cultural resources and man-made obstacles that impose restrictions and artificialities on the

tactical realism of the tasks and the overall exercise. These restrictions are significant factors in the SME's evaluation of the individuals' or units' ability to complete the specified tasks.

The second training scenario is used to assess the capability of the Base to support required training anywhere on the Base. Some training (e.g., individual tasks) need not always be conducted in an exercise scenario to be productive. However, on Camp Pendleton, much training that preferentially should be conducted in a realistic scenario cannot be, due to encroachments.

An assessment of 739 training tasks determined that encroachment has a measurable negative impact on field training at Camp Pendleton. The data indicated that all field training assessed at Camp Pendleton is affected to some degree by encroachment with ground training tasks being impacted the most. The quantitative assessment determined that a BLT training on Camp Pendleton in a notional, four-phase tactical training scenario is able to complete its required non-firing tasks to less than 68 percent of the Marine Corps standard. The findings of this assessment demonstrate that Camp Pendleton's ability to provide the full range of realistic combat training opportunities for Marines operating on and deploying from the Base is significantly hindered by encroachment.

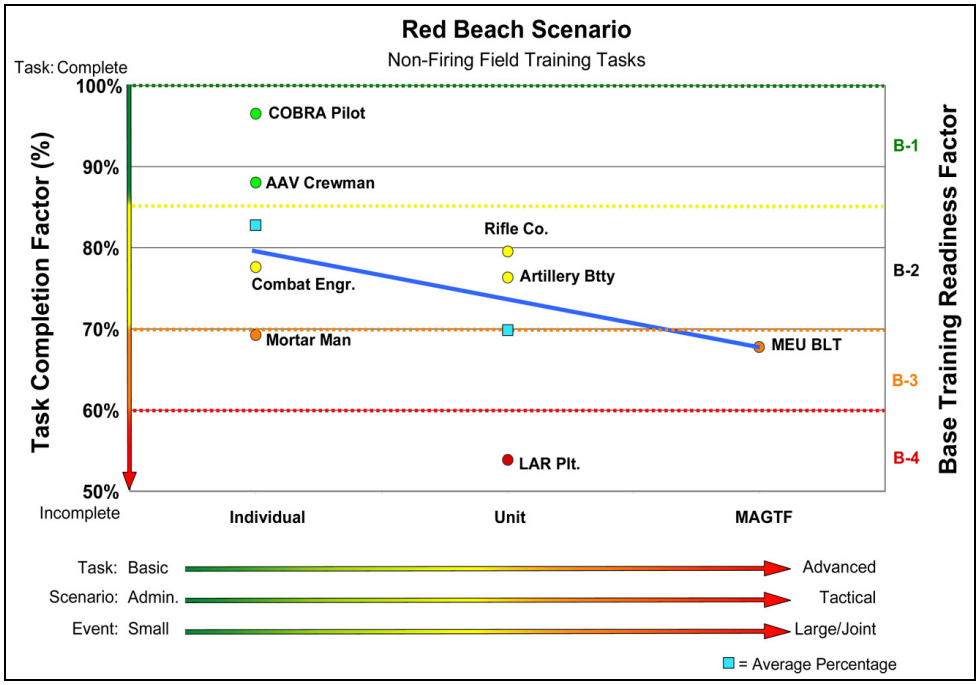

Figure C. Red Beach Scenario Task Completion as a Function of Training Event Size and Complexity

As reflected in figure C above, the analysis finds that in the tactical training scenario Camp Pendleton can support B-1 (greater than or equal to 85 percent of standard) for only two entities (25 percent) assessed. The Base is able to support B-2 (70 to 84.9 percent of standard) for three entities (37 percent) assessed, and B-3 or below (less than 70 percent of standard) for the remaining three entities (37 percent) assessed in the tactical, operational scenario. Otherwise stated, the Base's capability to support established individual and unit tasks within the context of the notional tactical scenario is B-2 or below for 75 percent of the entities evaluated and B-3 or

below for 37 percent of the entities analyzed. Thus, the Marine Corps' effort to identify and resolve encroachment issues is targeted to secure its installations' training capabilities that are necessary to support current and future training and operational mission requirements.

Of particular significance, the study determined that the effects of encroachment on training increase according to the relative complexity and size of the training event. In general, the larger the unit involved and the more complex the training, the more the impacts of encroachment drive down the task completion percentage. Advanced, integrated combat training, involving multiple combat elements, maneuver, and tactical operations generally is more restricted by encroachment than intermediate unit level training. Intermediate unit training, in turn, generally is more restricted than individual training (figure C).

As expected, the Base-wide analysis reflects that many of the tasks that were degraded in the operational scenario could be "completed" elsewhere on Camp Pendleton. The analysis revealed that Camp Pendleton is capable of supporting a B-1 standard (greater than or equal to 85 percent) for 63 percent of the entities assessed. Still, today's level of encroachment has degraded the Base's capability to support individual and unit training to B-2 for 37 percent of entities when assessing task "completion" only, on a Base-wide basis. The Base-wide assessment does not consider the diminished training value of the training task, which when accomplished outside of a tactical context yields segmented and less effective results.

The necessary training objectives must nevertheless be accomplished even when they cannot be completed at Camp Pendleton. While virtual or constructive approaches can provide value, Marine Corps training doctrine mandates a high proportion of field training to achieve and maintain combat readiness. Where the capability of Camp Pendleton to support training is degraded due to encroachment, unit commanders can seek to accomplish training in some other way (e.g., on a base-wide rather than in-scenario basis) or at a different location, such as Twentynine Palms. However, training conducted outside a continuous tactical iteration yields a segmented and less effective result. Reliance on training at other ranges results in increased costs, is time consuming, and leads to additional deployed time away from home for Marines. Moreover, training events that are displaced from Camp Pendleton by encroachment may be difficult to accommodate at another base or range. Workarounds for training displaced by encroachment are costly, may not provide high training value, and are becoming increasingly difficult to schedule and implement. This Study does not address the need to assess training and readiness issues associated with "workarounds."

The analysis indicates that restrictions relating to threatened and endangered species and their habitat have the biggest impact on training. The presence of wetlands and cultural resource sites were also significant encroachment factors. Certain types of Marine activities in the field are consistently impacted by encroachment. The most common include digging (e.g. fighting positions, vehicle defensive positions, artillery and mortar positions), earth moving (e.g. berms, revetments), off-road foot and vehicular movement, noise (artillery firing, bombing, helicopter flying), and airspace use (aircraft, artillery, mortars).

This assessment only looked at a small fraction of the training tasks that are performed at Camp Pendleton. It was conducted as an initial survey to begin to understand and quantify the impacts

of encroachment. It is not comprehensive in terms of the full spectrum of training that occurs on the Base. However, it does assess in detail the impacts of encroachment on a representative range of training tasks. All field training assessed at Camp Pendleton is affected to some degree by encroachment. Ground activities and tasks are impacted the most. Camp Pendleton's ability to provide the best possible training environment for Marines preparing to deploy overseas is significantly hindered due to the impacts of encroachment.

Marines who trained at Camp Pendleton and Red Beach in the 1970s and 1980s report that the restrictions on training have increased markedly and that today's training is much less realistic. This study has validated those observations. The "net loss" of Camp Pendleton's capability to support combat readiness training requirements is a matter of concern for future readiness.

The major conclusions from the assessment are:

- Encroachments have a measurable negative impact on field training at Camp Pendleton.
- Realistic training is significantly degraded within prime maneuver corridors, training areas, and on the training beaches at Camp Pendleton due to encroachments.
    - The Base's capability to support established individual and unit tasks within the context of the notional tactical scenario is B-2 or below for 75 percent of the entities evaluated and B-3 or below for 37 percent of the entities analyzed.
    - A Battalion Landing Team could complete its required non-firing tasks to less than 68 percent of the Marine Corps standard in the notional, four-phase tactical scenario.
- The type of training that is required to prepare Marine Corps MAGTFs for deployment and combat is also the type of training most affected by encroachments at Camp Pendleton.
- The types of training activities most inhibited by encroachment include digging, earth-moving, and off-road foot and vehicular movement.
- Regulatory restrictions on impacts or potential impacts to natural and cultural resources constitute the primary encroachment factors affecting the capability of Camp Pendleton to accommodate necessary military training. Endangered Species Act compliance is the leading encroachment factor impacting military training and operations at Camp Pendleton.

Key recommendations for possible future encroachment assessments include:

- Future assessments should consider not only the ability of the installation to support completion of a task, but also the impacts of encroachment on the training value obtained by task completion in a degraded training environment.
- The impacts of encroachment on training should be considered in both installation-specific and regional contexts to capture the cumulative and indirect impacts of encroachment on regional range complexes.
- Because the MAGTF (MEU, MEB or MEF) is comprised of distinct separate units that have their own training requirements, restrictions on unit training impact the MAGTF even before it commences its pre-deployment training sequence. Future quantification efforts should focus primarily on unit level requirements and capabilities and include assessment of MAGTF components or combined/joint unit operations.

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1. INTRODUCTION

The mission of Marine Corps Base (MCB), Camp Pendleton in 2002—as it has been for 60 years—is to ***train Marines for combat*** and to provide an optimum environment for that training. Its 120,000 acres, 17 miles of beaches, diverse terrain, and air space make it a valuable and indispensable base for the training of Marines. Over 40,000 training evolutions occur yearly. Over time, and particularly in the past 10-15 years, the ability of Camp Pendleton to train Marines has significantly eroded due to a variety of factors. Increasingly rapid growth and development throughout the region (and up to the Base's boundaries) has resulted in intense competition for resources—such as land, airspace, sea space, and frequency spectrum—that are need for military uses. For example, urban growth has exacerbated the depletion and degradation of biodiversity by converting the natural landscape to developed hardscape. This has directly impacted the Base, which remains predominately undeveloped. Loss of species habitat off-Base increases the regional significance of the Base's thriving wildlife and other natural resources, and leads to constraints on military training activities as a result of increasingly restrictive regulatory oversight. As with natural resources, the presence of cultural resources and the regulatory requirements for preventing disturbances to them result in significant restrictions on military training activities. Regional urbanization also has increased pressure on the Base to accommodate non-military land use (infrastructure and services) sought to support the expanding adjacent communities. Land set aside for non-military purposes has reduced the amount of land available for military training operations.

Today, these factors and other similar external pressures on military training resources- termed encroachment by the Department of Defense (DoD)—present an immediate, serious challenge to the capability of the Base to perform its military mission. Though encroachment is affecting military readiness in varying degrees throughout DoD, the effects of encroachment have reached a critical point at Camp Pendleton due to its geographic location situated in the urban corridor between Los Angeles and San Diego. At Camp Pendleton, the clear trend is toward increasing conflicts between military land, sea and airspace use and competing demands from commercial activities and regulatory interests.

Marines who train at Camp Pendleton and the leadership at the Marine Corps Base responsible for providing the best possible training environment know that the ability to provide realistic combat training has degraded due to encroachment. Those who trained at Camp Pendleton in the 1970s and 1980s comment on how different and more restrictive the training experience is in the year 2002 than it was 15 or 20 years ago. What has been lacking is a quantitative tool to measure the impact of encroachment on training and readiness at Camp Pendleton. The purpose of this assessment is to develop that quantitative tool and to measure the impacts.

2. OVERVIEW OF MARINE CORPS BASE, CAMP PENDLETON

Marine Corps Base, Camp Pendleton is the home for the First Marine Expeditionary Force, the First Marine Division, First Force Service Support Group, Marine Aircraft Group 39, the School of Infantry, the Assault Amphibious Vehicle Schools Battalion, and numerous other units. Camp Pendleton's mission is provide training areas, ranges, infrastructure, and services that ensure assigned Marines and units are able to achieve their training and readiness objectives prior to

deployment or assignment to operational forces. Standing commitments and contingencies require Camp Pendleton-based Marines:

- To be fully combat ready for regular deployment as Marine Expeditionary Units embarked on Navy Amphibious Ready Groups;
- For rotational deployment to Okinawa as forces for the III Marine Expeditionary Force;
- For deployment to Korea and the Middle East in support of standing war plans; and
- For contingency deployment anywhere in the world as America's 9-1-1 force.

Training at Camp Pendleton spans the spectrum of Marine training from schools for individual Marines, to small unit training, to advanced training for major combat elements such as Marine Expeditionary Units and the 1st Marine Division. It is the only amphibious training base on the west coast of the United States and is responsible for training and deploying Marines throughout the Pacific, South Asia, and Middle East. Annually, over 45,000 training events are conducted for the more than 60,000 Marines who use Camp Pendleton's ranges and training facilities.

National doctrine developed to guide the evolution of the Armed Forces (e.g., Joint Vision 2020) clearly articulates the need for the United States to maintain the ability to rapidly project power forward from the sea throughout the world. The strategic importance of littorals, which are home to the majority of the world's populations, illustrates that requirement. The Marine Corps' doctrinal concepts of naval Expeditionary Maneuver Warfare and Operational Maneuver from the Sea support this strategic vision. The capability to move Marine combat elements from sea to a military objective ashore is an essential aspect of combat capability and readiness, and national security. There is a clear mission and readiness requirement for Marines to be able to train in a continuous tactical amphibious scenario from ship to shore to objective at Camp Pendleton.

Camp Pendleton is a large military installation whose boundaries encompass approximately 125,000 acres, or about 200 square miles, of land area, the airspace overhead, and more than 17 miles of beach front along the Pacific Ocean. The base is situated between two major metropolitan areas: Los Angeles, 82 miles to the north, and San Diego, 38 miles to the south. Nearby communities include Oceanside to the south, Fallbrook to the east, and San Clemente to the northwest (figure 1). There are several large new housing developments immediately adjacent to the Camp Pendleton fence line. An Interstate Highway (I-5) transects the base and a public utility nuclear power plant is sited inside its boundaries. Surrounding land use includes a National Forest, urban development, rural residential development, and agricultural farming and ranching.

The San Diego region surrounding Camp Pendleton is experiencing unprecedented population growth. By the year 2020, population projections estimate a 35 percent increase over current levels, or an additional one million residents.

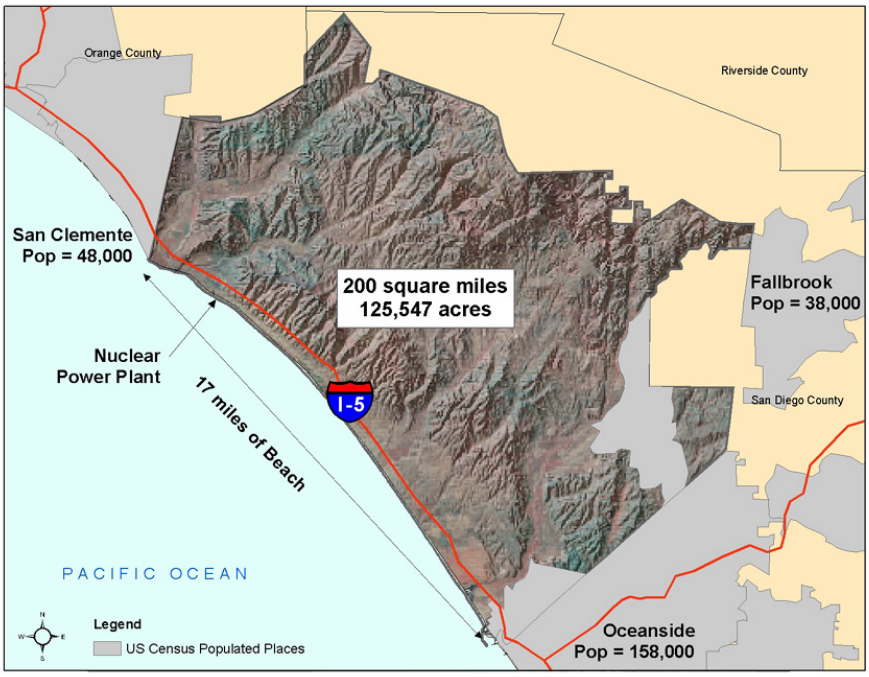


Figure 1. Camp Pendleton Overview

3. OVERVIEW OF ENCROACHMENT AT CAMP PENDLETON

For this assessment, encroachment is defined as any non-DoD action that has the potential to impede or interfere with Camp Pendleton's responsibility for the military readiness of Marines that train there. Urbanization in the vicinity of Camp Pendleton is generally the root cause of encroachment. Camp Pendleton once was remote from population centers. Today, urban development surrounds the Base (figure 2). The result is increased demand for regional infrastructure, loss of habitat, competition for airspace, concerns about military noise, degraded air quality, increasing regulatory scrutiny throughout the region, and other factors that directly impact the Base's capability to provide a realistic training environment.

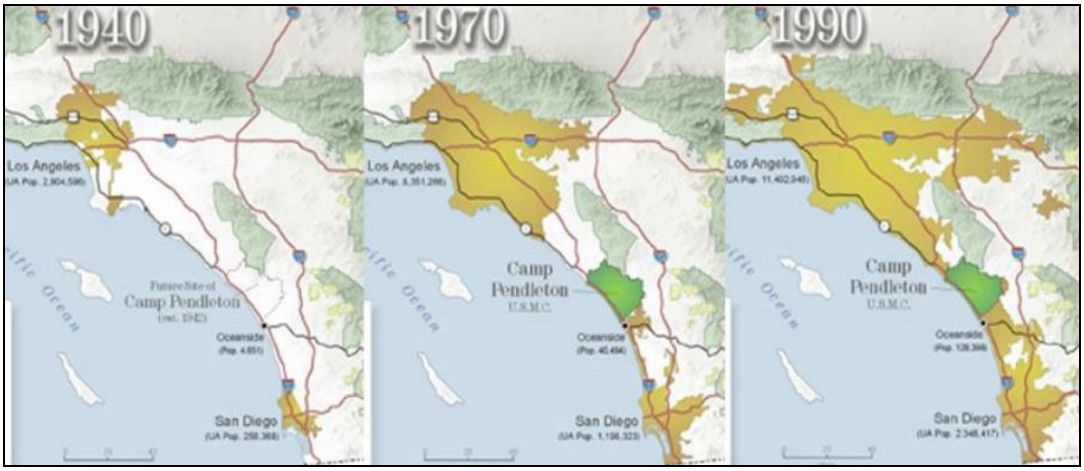


Figure 2. Urban Growth around Camp Pendleton

Over time, a number of factors—both environmental and manmade—have encroached upon the ability to train at Camp Pendleton. Environmental factors include: the presence of 18 threatened and endangered species and their habitat, cultural resources (generally archaeological sites), wetlands, and air quality. Manmade factors include: airborne noise, airspace restrictions, land use, and urban growth and development in the vicinity of Camp Pendleton. Species and habitat, cultural resources, and wetlands result in land areas where personnel and vehicular movement and activity are restricted or prohibited. Restrictions on airborne noise affect noise-producing military training activity, particularly at night. Airspace restrictions limit military training such as mortar and artillery firing as well as helicopter and fixed-wing aircraft training. Competing land uses, for example the presence of I-5, agricultural fields, and a nuclear power plant on military land, prevent military activity in these areas. Urban growth and development around Camp Pendleton has the effect of constraining military activity as the result of citizen complaints about noise, dust, smoke or other by-products of training.

Of particular concern to the Marine Corps are those factors resulting from the statutory requirements and regulatory application of the Endangered Species Act. Camp Pendleton is a prime example of what is termed an "island of biodiversity." San Diego County has more threatened plant and animal species than any other county in the continental U. S. with 37 endangered animal species and 40 endangered plant species. The region has been described as an endangered species "hot spot" of global importance. Although the southwestern California eco-region comprises over 8.4 million acres, Camp Pendleton comprises only 125,000 acres or approximately 1.5 percent of the region. Yet, it hosts regionally significant percentages of the total known population of nine of the eighteen listed species known to be present (figure 3). Sixty years of Marine training on the Base have proven to be compatible with preservation and sustainment of its natural resources. Additionally, Camp Pendleton has been very successful in managing these species. However, as the populations of these species increase, and new species are listed, land use restrictions imposed for the benefit of the species come at the expense of realistic military training.

Figure 3. Endangered Species Population Percentages at Camp Pendleton

The effects of encroachment are cumulative. Considering the size of Camp Pendleton, there might appear to be ample space to work around encroachment factors and accommodate Marine training at the same time. However, the layering of various restrictions due to encroachment results in training that is driven by the need to avoid certain areas, rather than the dictates of sound military judgment. The extent of the cumulative effects of encroachment is far-reaching. Camp Pendleton encompasses 125,000 acres, of which 23,000 acres are in the Central Impact Area and generally inaccessible to Marines on foot or in vehicles. The remaining 102,000 acres are divided into 33 training areas, including Red and White beaches. Every one of these 33 training areas is impacted by some type of terrestrial encroachment factor. Endangered species and habitat are present in 28 of the training areas, wetlands are located in 13 of the training areas, and cultural resources are found in 24 of the areas. Three specific examples will help illustrate the cumulative effects of encroachment:

(1) Camp Pendleton has 17 miles of sandy beach on the Pacific Ocean (figure 4), yet various restrictions and competing land uses severely limit the availability of beach for Marine amphibious training. From the city of San Clemente heading SE there is about 1 mile of state beach, one-half mile of Green Beach (usable only for very small amphibious operations), one-half mile of state beach, nearly one mile of San Onofre Nuclear Generating Station beach, 3.7 miles of state beach, two miles of beach containing Coastal California Gnatcatcher habitat, 1 mile of Red Beach which is used for larger amphibious landings, one and one-half miles of beach with vernal pools above, one mile containing the Cockleburr Sensitive Area (Coastal CA Gnatcatcher), almost 3 miles of the Santa Margarita Endangered Species Management Zone, and over one-half mile of the Del Mar Recreation Beach. There are 11 transit points under the I-5, railroad, and utility line easement corridors that run parallel to the coastline and allow access to inland training areas of the Base. However, only one of these underpasses is capable of supporting use by *all* military vehicles, equipment, and personnel, including tanks and other amphibious assault equipment. The result is that less than one mile, or 6 percent, of Camp Pendleton beach is realistically usable for major amphibious landing training. That is Red Beach.

    Red Beach is Camp Pendleton's primary and largest amphibious landing beach and provides the least restrictive access to the Base's inland training ranges. But, on Red Beach, what you see is not what you get. When restricted areas are overlaid on Red Beach and the vicinity, the space available for amphibious landing and maneuver is severely limited (figure 5).

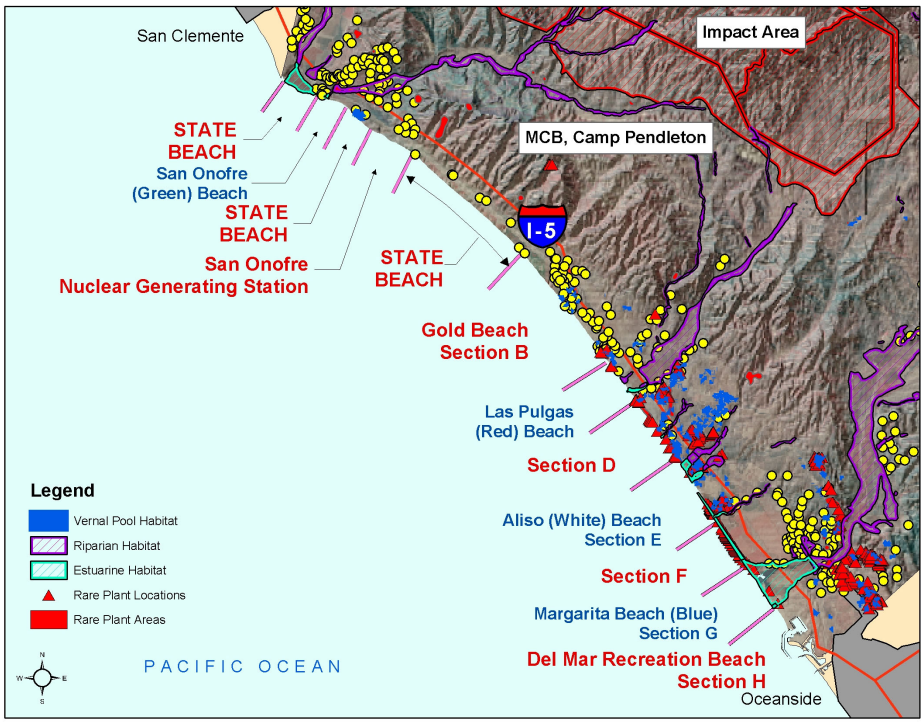


Figure 4. Camp Pendleton Beach

(2) The second example of encroachment impacts relates to land area available for operation of light armored vehicles (LAVs) that are integral to the tactical movement of Marines. In the interior of the base is a live-fire impact area where ground movement and maneuver are generally prohibited for safety reasons due to unexploded ordnance. Adding Camp Pendleton terrain that is not suitable for LAV tactical operations (due to slope, terrain features, etc.) further reduces the available area for mounted movement and LAV training. Using a tactical terrain overlay prepared by the Light Armored Reconnaissance Battalion at Camp Pendleton, the natural movement corridors from the beach to the live-fire impact areas are defined (figure 6). These corridors are "prime real estate" for mounted movement. But, when restricted areas are overlaid, it is easy to see that the "prime real estate" for Marine movement is also the "prime real estate" for protected resources. Though there are 200 square miles of land area at Camp Pendleton, Marines on the move and protected habitat are competing for the same limited space.

(3) The third example of impacted training resources is airspace. Access to and control of the airspace above an area of military operations is vital. Surveillance assets, strike aircraft, attack and transport helicopters, and mortar and artillery fire use it. Over portions of Camp Pendleton, a commercial air corridor paralleling the coast restricts military activity to a maximum of 2,000 feet above ground level, which adversely impacts both air operations and live mortar and artillery fire (figure 7).

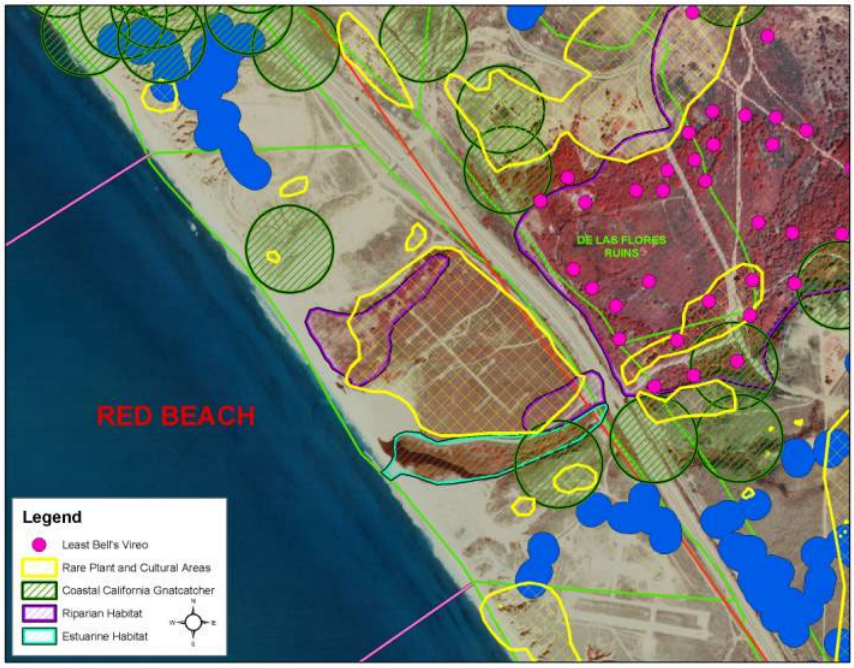


Figure 5. Red Beach Restricted Areas

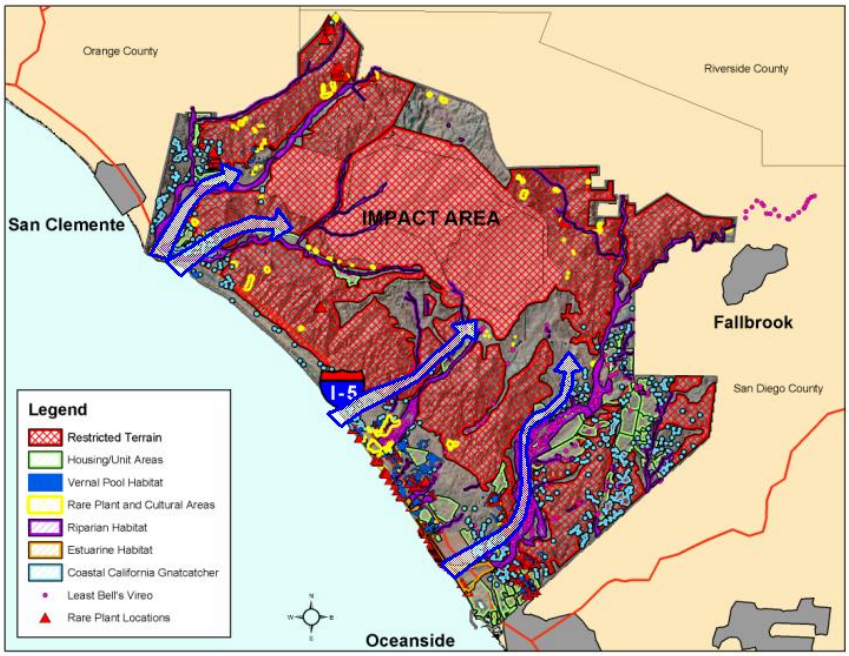


Figure 6. Operational Restrictions and Movement Corridors

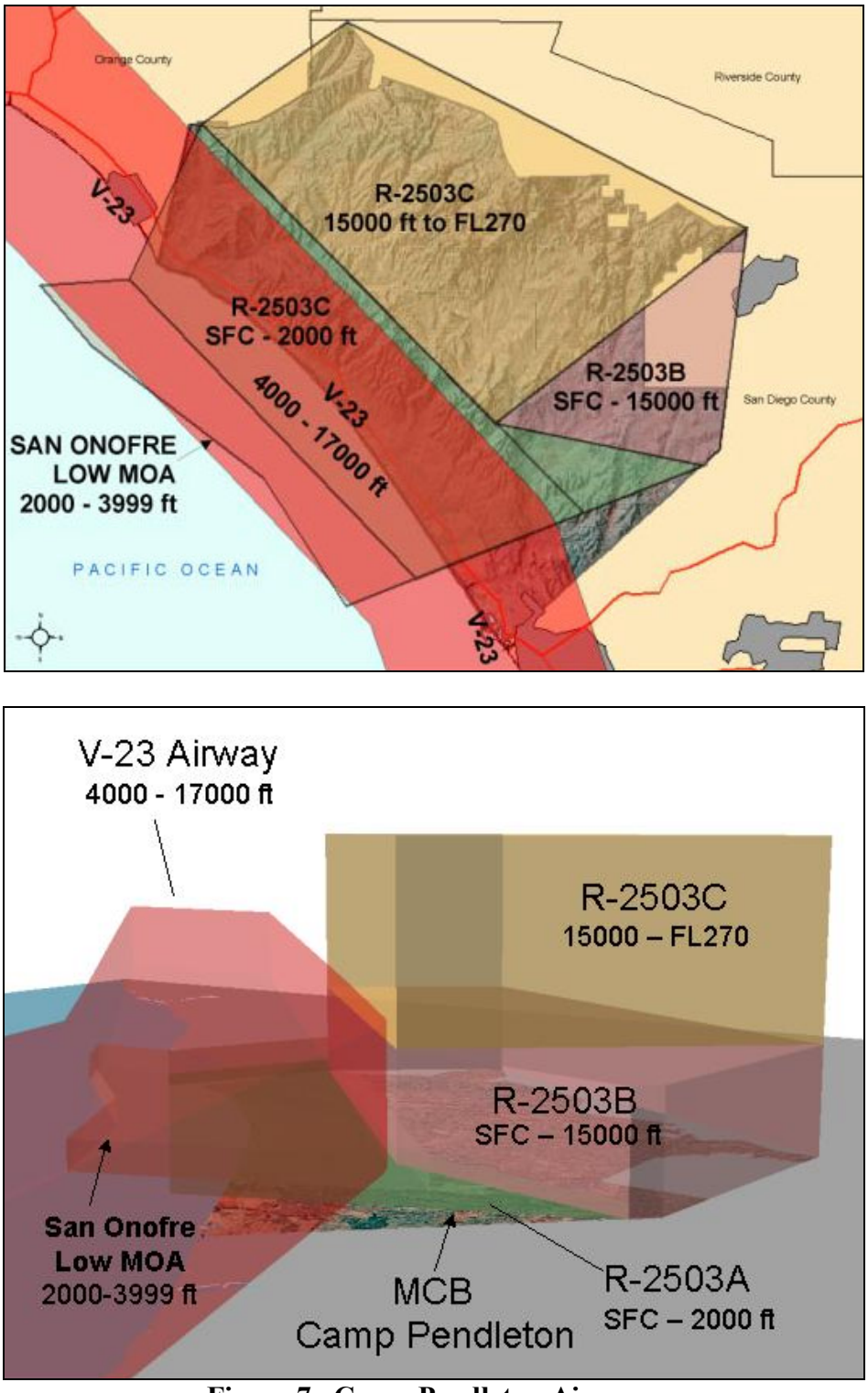


Figure 7. Camp Pendleton Airspace

4. ENCROACHMENT ANALYSIS AND ASSESSMENT

A. Background

The Commanding General, Marine Corps Base, Camp Pendleton discussed encroachment and its impact on military training in testimony before the Congress (Senate Armed Services Committee, and the Armed Services Committee and Government Oversight and Reform Committee of the House of Representatives) in Spring 2001. His testimony illuminated several examples of encroachment impacts on training at Camp Pendleton. As a follow-on to this testimony, the Base committed to developing supporting information, in addition to anecdotes and examples, through analytical quantification of the impacts of encroachment. This quantification assessment was initiated in October 2001 and was the seminal encroachment quantification effort within the DoD.

B. Purpose and Objectives

The purpose of the effort is to identify, analyze, and document factors that constitute an encroachment on Camp Pendleton's mission, particularly those that adversely impact or have the potential to impact ranges, training, and operations. As part of this process, metrics were developed to measure and quantify the impacts of encroachment on training operations of specific types of Marine Corps units.

The following objectives were developed by the Base to guide this and any future quantification efforts: At a minimum the assessment methods should:

- Apply to a representative cross-section of Military Occupational Specialties (MOSs), units, and weapons systems that utilized the Base.
- Focus on the perspectives and experience of the operational forces (i.e., subject matter experts) that train on the Base.
- Identify the work-arounds that have been used to address training events impacted by encroachment, and begin to develop a picture of the value of the Base as an important part of a regional complex of Marine Corps ranges and installations.
- Capture the costs of encroachment in terms of degradation in the mission capabilities of the Base.
- Be capable of repeat application in a consistent manner in future assessments and have utility as an analytical tool that can be readily applied by operational commanders and training managers at intermediate command levels.

The Commandant of the Marine Corps has highlighted the critical importance of bases and stations to the accomplishment of the Marine Corps' mission and identified bases and stations as the Fifth Element of the Marine Air-Ground Task Force (MAGTF). This assessment analyzes the capabilities of the Base to accomplish its mission of providing the necessary combat training environment for the MAGTF's ground combat, air combat, command, and combat service support elements. **The assessment does not analyze the readiness of individual units of Marine operating forces**. It is concerned solely with the capability, or "readiness," of Camp Pendleton as a Base to provide a realistic training environment.

The Base anticipates numerous management, range sustainability, and ultimately readiness benefits from its efforts to quantify encroachment impacts. Quantification identifies issues and validates anecdotal information about mission readiness concerns. Further, it assists with prioritization of issues, helping to focus efforts on finding solutions. This type of study also facilitates communication about encroachment impacts to target audiences, and elevation of issues to the appropriate level for resolution. Finally, quantification provides a tool for trend analysis, and documentation of progress in addressing the issues, or conversely, any ongoing degradation of mission capability. Such analysis in turn serves to identify emerging or unresolved concerns, re-focus priorities if necessary, and so on.

C. Approach and Methodology

(1) Operational Context

The scope of this initial assessment focused on several components of a Marine Expeditionary Unit (Special Operations Capable) (MEU). The MEU is a task-organized force composed of ground combat, air combat, combat support, and command and control elements. As the Marine Corps' front-line combat unit, the MEU must be immediately ready for combat operations as happened in Desert Storm, Somalia, and Afghanistan. The ground combat element of the MEU is the Battalion Landing Team (BLT), which consists of about 1,200 Marines. The MEU deploys from California embarked on three Navy amphibious ships that comprise an Amphibious Ready Group (ARG). Upon arrival at an area of operations, the MEU must disembark the ships and move ashore. This movement of Marines ashore can be accomplished via landing craft to a beach, helicopters to a landing zone, or both. A MEU is required to be trained and capable of executing both types of movement ashore. Pre-deployment training for the MEU culminates in complex amphibious exercises.

The operational training scenario at Camp Pendleton selected for this quantitative analysis of encroachment impacts is a notional four-phase MEU exercise involving:

- Phase 1: an amphibious landing of a Battalion Landing Team at Red Beach;
- Phase 2: tactical displacement of the BLT six miles through a maneuver corridor from Red Beach to an objective in the vicinity of the live-fire impact areas;
- Phase 3: deliberate assault of an enemy objective at the impact area; and
- Phase 4: the logistics sustainment of the combat forces.

The continuous operational scenario would flow from ships at sea, over Red Beach, through the Las Pulgas corridor, to the objective area in the vicinity of the Central Impact Area in the interior of Camp Pendleton (figure 8). All of the operations in this notional scenario are mission essential tasks, that is, tasks that Marine Corps doctrinal training manuals and Marine Corps Headquarters require the MEU to be trained and prepared to execute when they deploy. This scenario is typical of combat training the MEU should receive as part of a final graduation exercise immediately prior to overseas deployment.

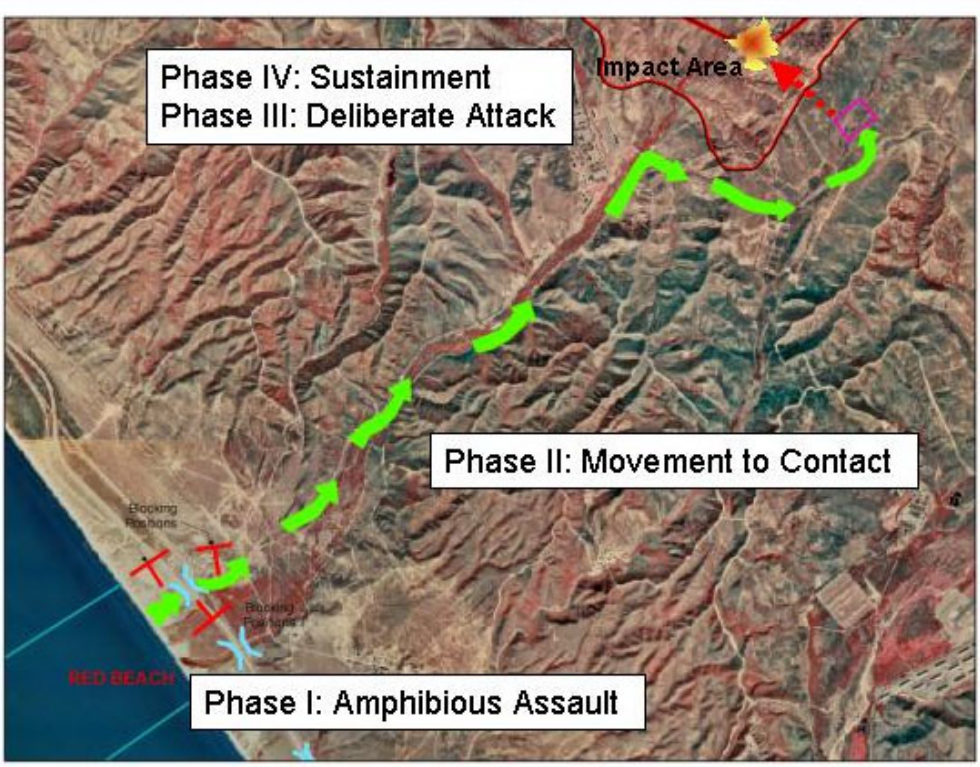


Figure 8. Battalion Landing Operational Scenario

(2) <u>Forces and Systems to be Assessed</u>

As an initial assessment, the objective was to analyze a broad, representative cross-section of the elements of combat power that comprise a MEU. For additional breadth in the analysis, training was categorized and assessed at three different levels: occupational fields (Military Operational Specialty (MOS)), weapons/equipment, and Marine combat units. A typical MEU that deploys from the West Coast of the United States is organized as depicted in figure 9. The components highlighted in yellow in figure 9 are the subject of the analysis in this assessment:

- Occupational field
  - Mortarman (MOS 0341)
  - AAV Crewman (MOS 1833)
  - Combat Engineer (MOS 1371)
- Weapons/Equipment
  - Light Armored Reconnaissance (LAR) Platoon
  - Artillery battery
  - AH-1W Cobra helicopter
- Combat Units:
  - Rifle Company
  - MEU Battalion Landing Team

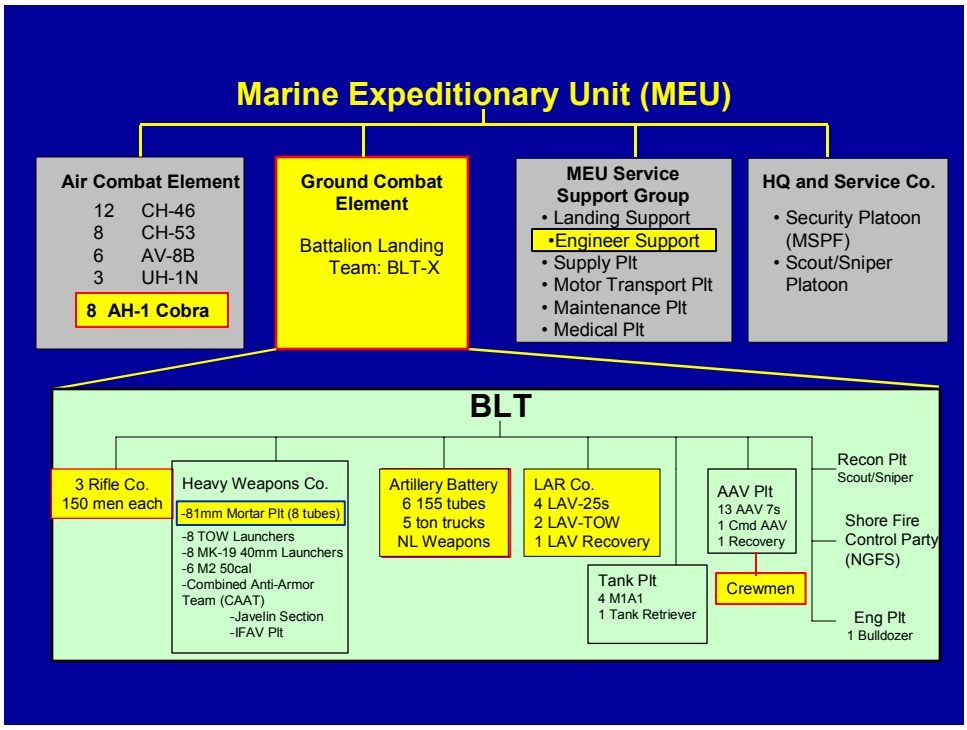


Figure 9. Notional Pacific MEU Organization

(3) Training Tasks

The assessment of the capability of Camp Pendleton to support training was conducted at the training task level. The overall operation was broken down into tasks taken from existing Marine Corps Orders (MCO) as follows:

- Individual Training Standards (ITS) (MCO 1510 Series) for:
  - Mortarman
  - AAV Crewman
  - Combat Engineer
- Training and Readiness Manuals (MCO 3501 Series) for:
  - LAR Platoon
  - Artillery battery
  - AH-1W Cobra
- Marine Corps Combat Readiness Evaluation System (MCCRES) (MCO 3501 Series) for:
  - Rifle Company
  - MEU Battalion Landing Team

The MCOs specify detailed conditions and standards for each task and establish the requirements for completing the task. As an example, the Mortarman Individual Training Standards describes the task of constructing a mortar position to include the dimensions of the position and the number of sandbags required for a completely prepared position.

All tasks for a particular category were included in the analysis. During the interview process, tasks were classified by Marine subject matter experts (SME) as one of three types according to the definitions below:

- Administrative task: a training task that does not require a range or field training area to fully complete to standard. Examples would include completing a preventive maintenance schedule and initiating a work request.
- Firing task: a training task that requires actual firing of a weapon or demolitions; firing tasks outside of impact areas are generally precluded for safety reasons. Safety of the public and safety of Marines is paramount, and training would never be conducted that knowingly endangers either. Inability to complete a firing event to standard for safety reasons have been distinguished from encroachment impacts.
- Non-firing field task: a training task that must be completed in the field but does not involve actual firing of weapons or demolitions.

Each task was first assessed in the ability to complete it to standard in the four-phase Red Beach landing scenario. If the task could not be completed fully to standard in the scenario, it was assessed for completion base-wide anywhere at Camp Pendleton.

(4) Metrics

Individual tasks were assessed through interviews with Marine SMEs as to the degree to which they can be completed to standard in the scenario and base-wide at Camp Pendleton. The metric used to assess the degree of completion of each task was a zero to ten scale derived from Marine Corps Training and Readiness Manuals. The metric is based on the combat readiness that would result from training received for the specific task:

- 10 = Fully combat ready
- 9 = Combat qualified (high threat)
- 8 = Combat ready (medium threat)
- 7 = Combat ready (medium threat)
- 6 = Combat capable (low threat)
- <6 = Not combat capable

The results provide an assessment of the capability of the Base to support Marine training. In this analysis, a metric to describe base readiness to support operational training is introduced and will be referred to as the Base Field Training Readiness Factor. Existing Status of Readiness and Training (SORTS) readiness categories are used as reference points to interpret the data. The base readiness factors for field training are defined as:

- B-1 = base is capable of supporting training for all wartime missions (≥85 percent to standard)
- B-2 = base is capable of supporting training for most wartime missions (>70 to 84 percent)
- B-3 = based is capable of supporting training for some wartime missions (≥60 to 69 percent)
- B-4 = base is not capable of supporting training for wartime missions (<60 percent to standard)

(5) Encroachment categories

Thirteen potential encroachment factors were considered in the analysis. They were categorized as either environmental or manmade and described as:

- Environmental encroachment factors:
  - *Air quality*: the Clean Air Act requires control of emissions commonly generated on an installation. Opacity regulations may impact ranges by restricting or prohibiting smoke training and mounted maneuvers;
  - *Cultural resources*: presence of archaeological sites where ground activity is restricted or prohibited;
  - *Ecosystem/biodiversity*: protection of an ecosystem in order to preserve a particular biota. Human activity could have an adverse impact even in the absence of endangered species;
  - *Endangered species:* the Endangered Species Act (ESA) lists threatened or endangered species and precludes or restricts activities that might adversely affect listed species or their habitats. By law, it is illegal to 'take' a listed species, which might be interpreted to include significant habitat disturbance. Mission impacts would include restrictions on ground or aircraft activities based on their potential to take species or adversely modify "critical habitat," if designated.
  - *Maritime sustainability*: seven different regulatory programs apply to maritime activities; examples include the Marine Mammal Protection Act, Coastal Zone Management Act, and Magnuson-Stevens Fishery Conservation and Management Act, which establishes "essential fish habitat." The impacts of these regulations include restrictions on the use of explosives in the water and activities potentially affecting marine life.
  - *Water use*: the Clean Water Act and Safe Drinking Water Act regulate pollutants that are introduced to the environment. There are potential impacts on training activities from restrictions involving liquid or waste discharges and unexploded ordnance.
  - *Wetlands*: regulations issued by the Army Corps of Engineers and the Environmental Protection Agency require protection of wetlands in order to minimize degradation. These regulations may impact a variety of ground activities.

- Manmade encroachment factors:
    - *Airborne noise*: local community pressure and/or opposition potentially impact noise producing activities such as aircraft operations, artillery and tank firing, and bomb and missile drops.
    - *Airspace restrictions*: Special Use Airspace (SUA) is required for military operations; SUA is in competition with the growing demand for commercial airspace. Lack of SUA potentially impacts military air operations as well as artillery and mortar firing.
    - *Radio frequency spectrum*: military command, control, and communications activities require portions of the available radio frequency spectrum. Competition for the spectrum from commercial interests has caused a loss in DoD access to some frequencies.
    - *Urban growth*: this factor includes population growth and development near military installations that may be incompatible with the installation's military training mission. This factor is the root and underlying cause of most encroachment issues.
    - *Land use*: incompatible and competing uses of land, either inside or outside the base fence line, that are not attributed to urban growth. Examples could include interstate highways, agricultural fields, and leased land.
    - *Unexploded ordnance (UXO) and constituents*: four federal regulations apply to UXO, generally on closed ranges. However, active ranges elsewhere than Camp Pendleton have been closed or threatened with closure as the result of transport of UXO constituents through the environment beyond installation boundaries.

(6) Safety

Safety is not encroachment. Safety of the public and Marines is the first and highest priority in all training activities. At times, some training tasks cannot be completed fully to Marine Corps standards for reasons of safety. This analysis uses two safety categories: public safety and training safety. Either or both safety categories were noted, as applicable, for training tasks affected.

(7) Data collection process

The data collection method used for this assessment was face-to-face interviews with Marine Corps SMEs. The SMEs were Marines with a significant operational expertise, including training knowledge and experience at Camp Pendleton in the area being assessed. Typically, the SMEs were of Captain or Major rank and they all were currently serving in an operations or training billet in a unit assigned to Camp Pendleton. Their professional military judgment as to the ability to complete specific training tasks to Marine Corps standards at Camp Pendleton was the basis for the data and subsequent analysis. A list of subject matter experts by billet is included in Section 7.

All interviews were conducted at MCB, Camp Pendleton during the period December 2001 to May 2002. The same principal investigator (PI), a contractor, conducted all of the interviews for

this assessment. In addition to the PI and one or more SMEs, various representatives from the Base observed all interviews.

The interviews were conducted in accordance with a standardized procedure developed by the PI (Appendix A). The interview began with the PI presenting a short "scene-setter" brief to explain to the SMEs the background, purpose, and methodology of the assessment and the process to be used during the interview (Appendix B). The basis for the interview was Marine Corps training tasks. Every training task for the component being assessed was listed on a spreadsheet. The PI reviewed each individual task to obtain the following information based on the professional military judgment of the SME(s):

- Event type (administrative, firing, non-firing);
- Ability to complete the task in the Red Beach scenario in one of three categories (fully, degraded, not mission capable);
- Numerical assessment of ability to complete task in the Red Beach scenario based on a zero to ten scale discussed above in subparagraph 4;
- Inhibited activities for those tasks not capable of being fully completed;
- Encroachment factors or factors that degrade or inhibit full completion of the task;
- Public or training safety impacts on task completion;
- For tasks that cannot be fully completed within the Red Beach scenario, assess the ability to complete the task anywhere at Camp Pendleton using steps (2) through (6) above. Tactical training value is not assessed, only degree of task completion according to conditions and standards in the MCO;
- Unit size and/or range size issues or limitations in completing the task; and
- Work-arounds for tasks that cannot be completed at Camp Pendleton.

(8) Analysis Process

The data collected from SME interviews were entered into a separate spreadsheet for each area assessed. Tasks were segregated into non-firing, firing, and administrative tasks. The individual numerical values for task completion were added together to obtain a total. This completion total was divided by the maximum possible points (number of tasks x 10) to derive the percentage of training that can be accomplished to standard. The accomplishment factor was calculated separately for each analytical scenario, i.e., operational Red Beach-Las Pulgas Canyon scenario and the Base-wide scenario for: (1) only non-firing field training tasks; (2) non-firing and firing field training tasks; and (3) all tasks including administrative tasks. The number of tasks that were inhibited by each encroachment factor was also totaled for both the operational scenario and base-wide.

The completion to standard of all tasks in a specific assessment area requires a 'yardstick' to illustrate the significance of the completion percentage. Two metrics are used. The first, the zero to ten scale, is based on Marine Corps Training and Readiness Manuals as discussed in subparagraph 4 above. The second is the Base Field Training Readiness Factor based on SORTS percentages that are used to measure readiness throughout DoD. The readiness metrics do not represent the readiness of any Marine unit. Both are used in a new way to characterize the capability of the Base to support the specified training tasks. The relationship between the two metrics is displayed in figure 10.

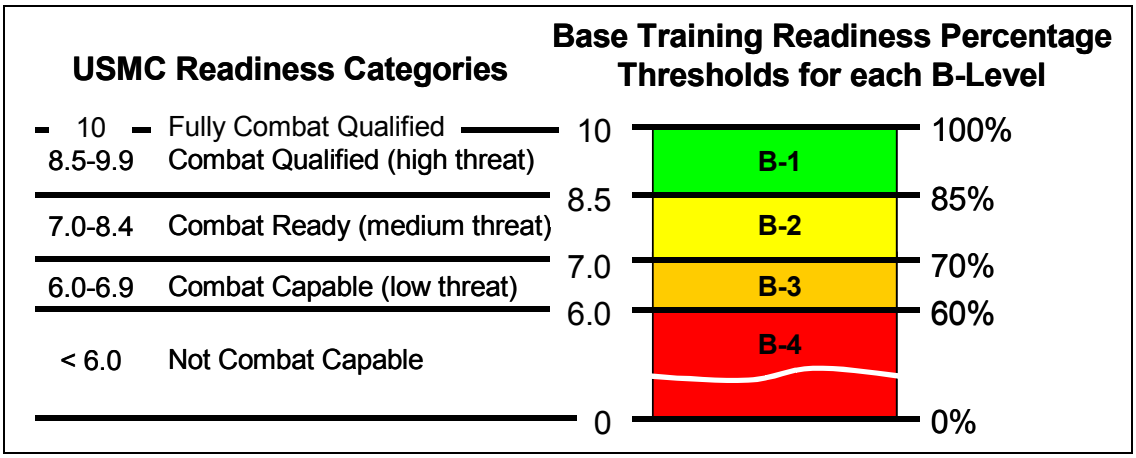


Figure 10. USMC Readiness Categories and Base Training Readiness

(9) Database

A stand-alone relational database application, named the Training and Range Encroachment Information System (TREIS), was developed in Microsoft Access 2000 for the data collected during the interview sessions. The database relates three main entities: training tasks, Camp Pendleton training areas, and encroachment factors. The database design is based on a set of requirements gathered from the potential database users. The key requirements of the database are:

- Track and report on capabilities of Camp Pendleton Training Areas to support Marine training;
- Provide quantitative assessments of encroachment impacts on combat training occurring within Camp Pendleton training areas; and
- Provide an easy-to-use tool to collect and view information on training tasks, Camp Pendleton training areas, and encroachment factors.

The database requirements document included as Appendix C contains a formal discussion of the requirements.

The database uses a relational database model in order to meet the key requirements, reduce data redundancy, and maintain relational integrity among the main database entities. The database consists of four main components: a table schema, a set of programmed interfaces or forms, formatted reports and charts, and a help system. The database table schema organizes the data into a set of normalized, non-redundant tables with defined relationships. The interfaces, which are Access forms, provide different views of the data and allow users to add or edit the data collected. Microsoft Visual Basic for Applications (VBA) controls behavior of the interfaces to perform the specified required database functions. The automatically generated reports and charts provide an efficient method for analyzing the data collected. Finally, users can access the help system to learn more about database functions, or to get help with a particular task they wish to perform.

5. RESULTS OF THE ENCROACHMENT ANALYSIS

A. Operational Scenario Description

A MEU deploys from the United States embarked on three Navy amphibious ships comprising an ARG. Upon arrival in the area of operations, the MEU must be capable of operational movement and maneuver of Marines and equipment prepared for combat from ship to shore. The threat ashore could range from permissive (non-hostile), to uncertain, to a hostile environment. One mission essential task the MEU is required to be trained to conduct is an amphibious assault in a hostile environment across a defended beach. The tactical scenario used in this assessment represents a notional MEU pre-deployment exercise where the objective is to train as close as possible to 100 percent of the standard. Those tasks not completed to standard in the scenario must be accomplished elsewhere.

Phase 1 of the training operational scenario is an amphibious assault launched from the ARG ships several miles offshore to Red Beach at Camp Pendleton. Prior to the landing, the MEU would covertly insert reconnaissance (recon) teams inland of Red Beach to gather intelligence on enemy dispositions, provide laser designation for laser-guided weapons, and Initial Terminal Guidance to assist incoming landing craft to make a safe and accurate approach and landing. The presence of an Interstate Highway (I-5) less than one-half mile from the beach limits the options available for positioning and employment of recon forces. The presence of habitat all around Red Beach prevents recon forces from digging in and establishing camouflaged, covered positions essential to maintaining covertness and for survival in enemy-held territory.

The combat power of the MEU is the Battalion Landing Team, or BLT. One of the first BLT combat units to land on the beach during the amphibious assault would be the Light Armored Reconnaissance Company with their Light Armored Vehicles loaded on four air-cushion landing craft called LCACs. Despite the 17 miles of beach at Camp Pendleton, only 2 of the 4 LCACs would be able to land simultaneously at Red Beach due to the presence of endangered species habitat on and around Red Beach. The result is reduced and segmented combat power on the beach in the initial assault and training events that are not realistically executed. Once the LAVs are on the beach, they are unable to maneuver or deploy tactically due to habitat and cultural resource areas in the immediate vicinity of Red Beach. In addition to the confined space of the available beach, the vehicles are generally limited to operating on hard-packed sand and existing roads. These are not the tactics that would be appropriate in a real world landing in a hostile environment. Throughout the landing, the operations, maneuver, and tactics the LAR Company employs in the training scenario are far removed from what would actually be done in combat.

Landing closely behind (or concurrently with) the LAR Company would be three Rifle Companies transported in Amphibious Assault Vehicles (AAV) and the Heavy Weapons Company including a mortar platoon. The AAVs should land on the beach and rapidly push inland. Restrictions from encroachment on Red Beach prevent this tactical action. Instead, the AAVs must exit Red Beach in an administrative manner using designated routes. The mortar platoon would be expected to reconnoiter, identify locations, and rapidly construct mortar positions to cover the ongoing landing. Mortar positions require digging for fighting holes and for filling 6,000 sand bags per mortar position. The presence of habitat and cultural sites all

around the Red Beach area prevent the mortar man from digging, as they would be required to do in an opposed landing in a hostile or uncertain environment. The infantry and heavy weapons company in the MEU will not get realistic training during the landing.

An artillery battery is a major component of the MEU that will land at Red Beach. It consists of six 155mm tubes, each towed by a 5-ton truck. Upon landing, the tubes should rapidly disperse and deploy into defensive positions. These tasks require off-road movement and digging. Again, such actions are precluded by space on the landing beach and the surrounding habitat and cultural resource areas that restrict the vehicles and artillery pieces to roads and prevent digging of defensive positions.

Once the beachhead is consolidated, Phase 2 of the operation begins when the Commander of the Landing Force directs the force to begin movement to the objective. The first task is to get past I-5. From Red Beach there are two small underpasses that can be used. The underpasses chokepoints and restrictions on off-road maneuver prevent the movement under I-5 from being done tactically. After the force administratively crosses under I-5, regroups and begins to move up the Las Pulgas Canyon corridor, the LAVs are severely restricted in off-road movement due to species habitat and wetlands and generally unable to deploy and traverse in a tactically appropriate way.

The mortar platoon would be expected to displace from one position to new positions to cover the force movement, but restrictions on digging required to construct positions does not permit this tactical action at Camp Pendleton outside established Mortar Fire Areas (MFAs). In turn, the artillery would occupy positions and be prepared to fire in support of the movement. However, artillery positions are confined to designated and pre-approved Artillery Firing Areas, which preclude the choice of optimally defensible positions. In addition, the digging of individual fighting positions for the artillery battery and revetments for vehicles is prohibited in AFAs, which limits tactical realism. Artillery positions should be camouflaged, but use of foliage is prohibited for this purpose. Airspace restrictions severely limit firing from designated Artillery Firing Areas near the Las Pulgas movement corridor. Movement of the artillery to the objective should be accomplished by a terrain march in a real-world environment. This training is not feasible in Las Pulgas Canyon or other movement corridors at Camp Pendleton due to habitat and wetlands. As a result, the movement is essentially an administrative event.

At the point where movement stops and defensive positions are established, the Rifle Companies, LAR platoon, artillery, and mortars should all prepare fighting and battle positions. Restrictions on digging due to species habitat prevent each group from completing this task to standard. For the individual Marine, digging a fighting hole is a force protection measure that should be accomplished as soon as possible in any static position. This critical aspect of individual discipline in the field is absent from all exercises at Camp Pendleton due to environmental restrictions.

Phase 3 of the operational scenario is a deliberate assault of an enemy objective in the vicinity of the central impact area at Camp Pendleton. The requirement for off-road movement of Marines, digging weapons positions appropriate to the tactical situation, and preparation of hasty defensive positions are all severely restricted and result in less than realistic combat training.

Back at Red Beach, the MEU's Combat Service Support Element (CSSE) would begin Phase 4 of the operation by establishing the logistics base necessary to support the operations ashore. The CSSE would set up local perimeter security and a defensive fire plan at Red Beach. This would require extensive digging and off-road vehicular movement, both severely restricted at Red Beach. In addition, the CSSE would establish an ammunition supply point (ASP), fuel and water distribution facilities, vehicle maintenance area, supply depot, mess facilities, and an enemy prisoner of war (EPW) holding facility. To be done in accordance with Marine Corps standards, each facility requires construction of surrounding berms, earth walls, or revetments, which cannot be done at Red Beach. A notional configuration of the CSSE overlaid on Red Beach is depicted in Appendix D. It should be noted that the requirement to establish combat support operations on the beach can exist even where the assault itself is at a different beach, or carried far inland by helicopter-borne forces. It is clear that encroachment factors at Red Beach preclude realistic set-up of CSSE facilities and adversely impact CSSE training.

B. Quantitative Results—Training Task Analysis

(1) Overview

This assessment examined the capability of Camp Pendleton to support the completion of 723 training tasks for four Marine Corps units and four military occupational specialties (MOS) that are components of a MEU. The output of the analysis was a training task completion factor, expressed in percent of Marine Corps training standards, of the ability to complete: (1) non-firing field-training tasks; (2) all field tasks including firing events; and (3) all tasks including administrative tasks. If all tasks could be fully completed to standard, the score would be 100 percent. If all tasks could be completed to 50 percent of standard, the score would be 50 percent. If one task could be completed to 100 percent and another task could not be completed at all, the net score for the two tasks would be 50 percent.

As the first assessment of this type, the training tasks covered a broad range of Marine Corps training activity from individual to MAGTF. As field training progresses from individual to unit to MAGTF level, the scale of training events grows from small to large and the complexity increases from basic to advanced integrated training. The eight types of training assessed can be classified as:

- Individual Training:
  - Mortarman
  - Combat Engineer
  - AAV Crewman
  - AH-1 Cobra Pilot
- Unit Level Training
  - LAR Platoon
  - Artillery Battery
  - Rifle Company
- MAGTF Level
  - MEU Battalion Landing Team

(2) Completion of Training Tasks—Red Beach Scenario

A display of the quantitative data for training tasks conducted in the Red Beach operational scenario is presented in figure 11. These results are for non-firing field training tasks, which in the scenario are the best measure of pure encroachment impacts because firing tasks are inhibited by both encroachment and safety factors. The training task completion percentage data points are grouped according to whether the training tasks in that category are principally individual, unit, or MAGTF level tasks. The base readiness factor (right hand side) provides a metric to assess the Base's capability to support the completion of training tasks using B-1 through B-4 as previously defined on page 18.

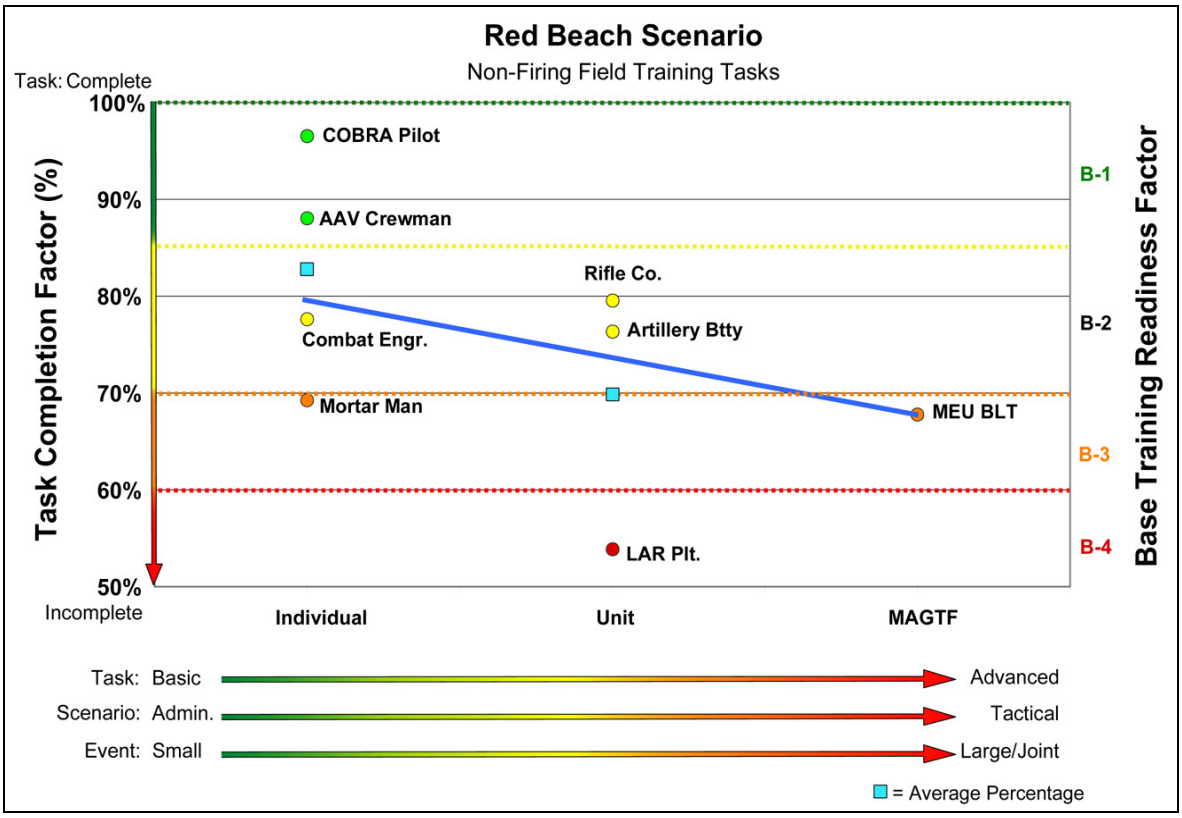


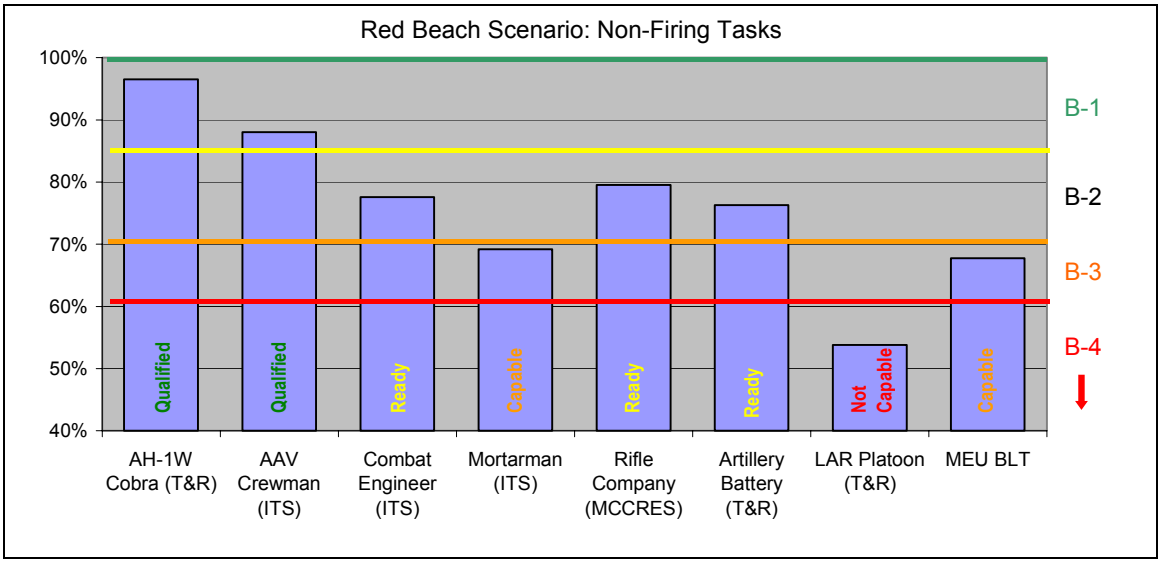
Figure 11. Red Beach Scenario Task Completion as a Function of Training Event Size and Complexity

It is important to note that the base readiness factor does not represent actual readiness of any Marine unit. Rather, it is a report card on Camp Pendleton's ability to support Marine training and provides a context for understanding what a specific task completion factor percentage means.

The trend of the Red Beach operational scenario data is apparent. In general, the larger the unit involved and the more advanced and complex the training, the lower the task completion percentage is as a result of encroachment impacts.

A summary of Red Beach operational scenario data by category of training is presented in figure 12. More detailed results for each category are included in Appendix E.

Category	Non-Firing Tasks			All Field Tasks		
	Completion Percentage	Combat Readiness (Threat Status)	B-Level	Completion Percentage	Combat Readiness (Threat Status)	B-Level
AH-1W Cobra (T&R)	97%	Qualified (high)	B-1	79%	Ready (medium)	B-2
AAV Crewman (ITS)	88%	Qualified (high)	B-1	80%	Ready (medium)	B-2
Combat Engineer (ITS)	78%	Ready (medium)	B-2	63%	Capable (low)	B-3
Mortarman (ITS)	69%	Capable (low)	B-3	49%	Not Combat Capable	B-4
Rifle Company (MCCRES)	80%	Ready (medium)	B-2	77%	Ready (medium)	B-2
Artillery Battery (T&R)	76%	Ready (medium)	B-2	58%	Not Combat Capable	B-4
LAR Platoon (T&R)	54%	Not Combat Capable	B-4	34%	Not Combat Capable	B-4
MEU BLT	68%	Capable (low)	B-3	65%	Capable (low)	B-3



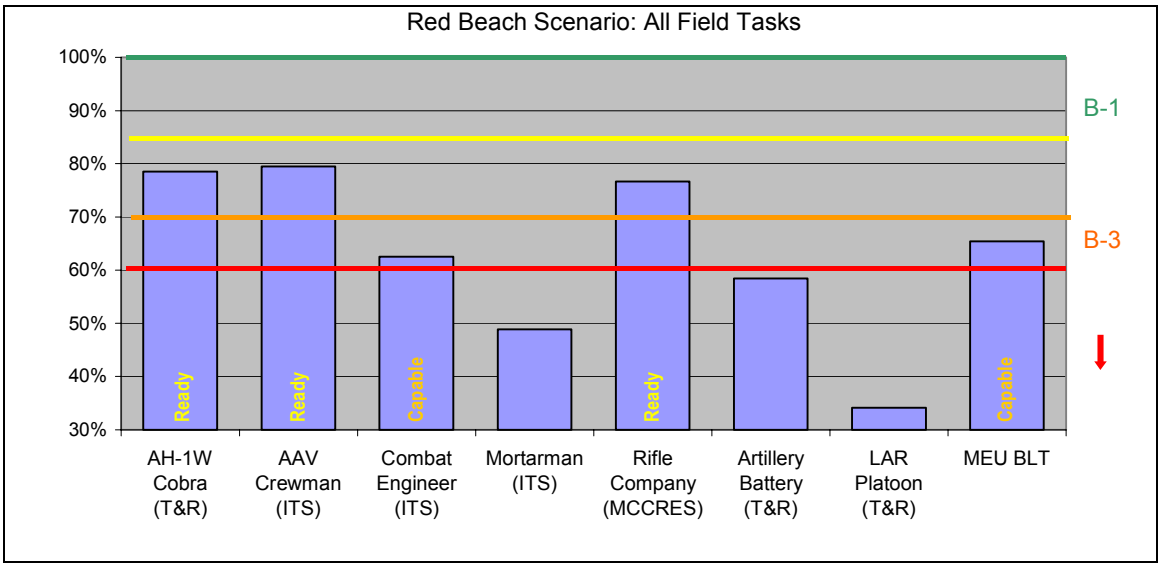


Figure 12. Red Beach Operational Scenario Results

Highlights of the impacts of encroachment in the Red Beach operational scenario include:

- For ground combat arms unit level training (rifle company, artillery battery, and LAR platoon), non-firing field training tasks can be completed to 75 percent of standard. This equates to a readiness of Combat Ready (medium threat) in accordance with Marine Corps Training and Readiness standards and a base readiness factor of B-2.
- For a MEU Battalion Landing Team in the four phase continuous operational scenario, non-firing tasks can be completed to 68 percent of standard, which would equate to Combat Capable (low threat) and B-3 for the base.
- Certain tasks for the BLT are identified in the Marine Corps Combat Readiness Evaluation System as having special significance and our called "key indicators". Key indicators were completed to 64 percent of the Marine Corps standard in the Red Beach scenario. This equates to Combat Capable (low threat) and B-3 base readiness factor.

The results indicate that at the conclusion of a notional final graduation exercise for a MEU prior to overseas deployment, a point at which training readiness should be at a maximum, completion of the non-firing field training tasks for the hypothetical MEU BLT was more than 30 percent below Marine Corps standards due to the effects of encroachment within a continuous operational training scenario at Camp Pendleton.

Two data points warrant additional explanation. The first is the high Cobra pilot task completion factor. Two factors drive this outcome. First, since the helicopter has almost no impact on terrestrial resources, of the ten encroachment factors that impact non-firing field events, only three—airspace restrictions, airborne noise, and air quality—have significant potential to impact helicopter operations. Second, the tasks are predominantly core pilot skills and not MAGTF level tasks. The Cobra training tasks in the T&R Manual define core squadron capabilities and provide a syllabus for basic, transition, conversion, and refresher pilots. Advanced tactical training for Cobras, which is almost entirely done at Twentynine Palms or Yuma, is not included in the T&R Manual. A Cobra SME explained that the reason advanced Cobra training is not conducted at Camp Pendleton is that there is not enough lateral space. The largest ranges at Camp Pendleton take only three minutes to fly completely across, which is not conducive to realistic combat training. Even if there were no encroachment issues, Cobras would still go to Twentynine Palms or Yuma for advanced training. The physical size of Camp Pendleton is the limitation on Cobra training, not encroachment.

Because of these two factors—lack of impact on terrestrial resources and a predominance of core capability tasks—the Cobra results show a high task completion factor. This should not lead to the conclusion that encroachment does not have a significant impact on Cobra training at Camp Pendleton. Rather, it is a category of training that merits further analysis based on a set of tactical training tasks that are required to be completed at Camp Pendleton and that are representative of training tasks for a Cobra squadron.

The second data point that warrants additional explanation is the low completion factor for the LAR platoon. This result is due to the large number of LAR training tasks from the T&R Manual that require off-road maneuver, which is severely inhibited in the training areas that would support the Red Beach operational scenario.

(3) Continuous versus Segmented Training

Some training tasks can be completed more fully outside the scenario when there is a suitable location somewhere at Camp Pendleton, but not one that supports the continuous flow of the scenario. More tasks can be accomplished when performed at a prescribed location and/or following a prescribed set of conditions. Such conditions may be sufficient for school training where individual proficiency with equipment and tasks are the objective. However, the training value for unit combat skills and readiness is generally far less than if completed in the context of a continuous operational scenario. This effect is called "segmentation" of training, which is training disconnected in time and place and scenario. It is analogous to a football team practicing by coming to the line of scrimmage, taking the snap, then relocating to a second field to practice a running play, to a third field if they need to practice passing, and to a fourth field to practice kicking a field goal. Even though each task will be completed, the training environment is less than realistic and the training is not done in a manner or with the timing and coordination that would be required in an actual game. For this reason, the continuous operational scenario is a preferred environment for training Marines for combat.

(4) Completion of Training Tasks—Base-wide

For training tasks that cannot be fully completed to standard within the Red Beach operational scenario, the SMEs were asked to assess the ability to complete the same task more fully at an alternate location on Camp Pendleton. The SMEs were not asked to assess the comparative tactical training value of completing the task outside the scenario but only to assess the ability to complete the segmented task in accordance with the conditions and standards from applicable Marine Corps Orders. A display of the quantitative base-wide data for the same training tasks as assessed in the Red Beach operational scenario is presented in figure 13. As with the Red Beach data, the training task completion percentage data points are grouped according to whether the training tasks in that category are principally individual, unit, or MAGTF level tasks. The base readiness factor (right hand side) provides a metric to assess the Base's capability to support the completion of training tasks using B-1 through B-4 as previously defined on page 18. Again, the base readiness factor does not represent actual readiness of any Marine unit but is a report card on Camp Pendleton's ability to support Marine training.

Unlike the in-scenario graph, the base-wide graph in figure 13 does not include a trend line. The reason is that the trends observed in-scenario are not apparent base-wide. Training that cannot be completed in-scenario, is capable of being completed more fully somewhere on the Base regardless of size of the unit or complexity of the event. However, increases in task completion factors must be offset against the reduction in training value from segmenting the training tasks as discussed in the previous section. The interviews did not determine how the commanders were getting the segmented training done—whether with their entire unit or perhaps as a standalone event for a component of a larger unit—so figure 13 does not characterize the spectrum of training from basic to advanced, administrative to tactical, and small to large scale, as in figure 11 in-scenario. It is also important to note that this assessment did not make a training value comparison of tasks completed inside and outside the scenario. This consideration will be reflected in recommendations for possible future assessments.

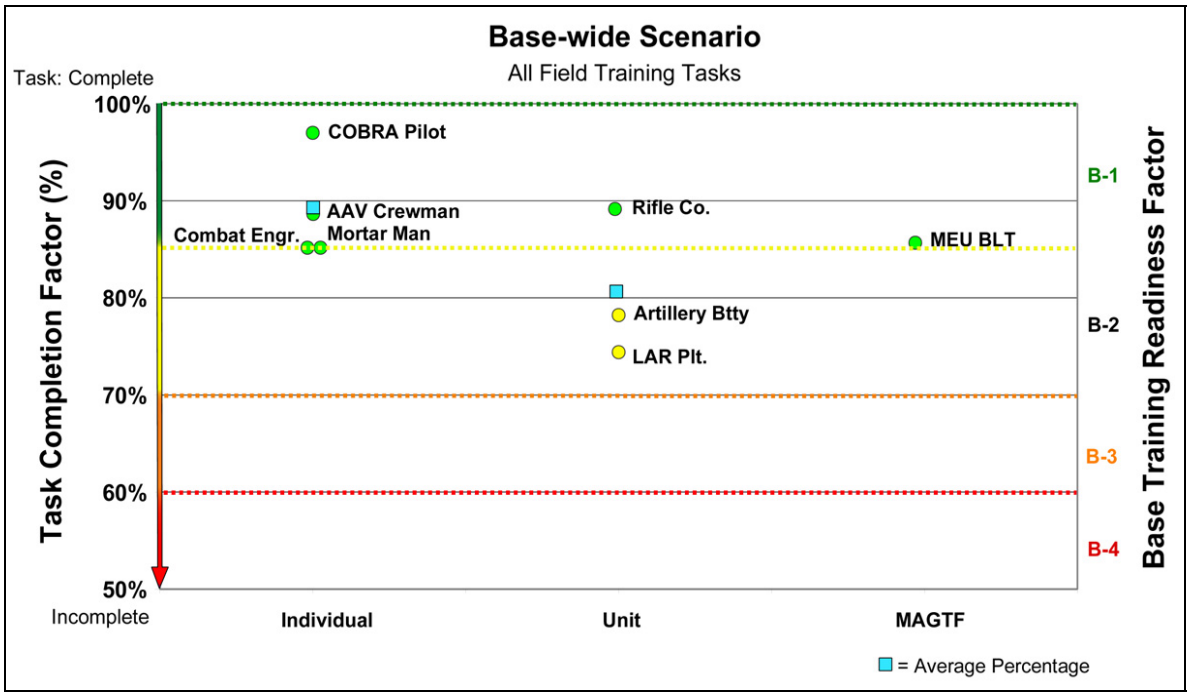


Figure 13. Base-wide Task Completion as a Function of Training Event Size and Complexity

A summary of Red Beach operational scenario data by category of training is presented in figure 14. More detailed results for each category are included in Appendix F.

Highlights for the base-wide impacts of encroachment include:

- For ground combat arms unit level training (Rifle company, Artillery battery, and LAR platoon), all field-training tasks can be completed somewhere on Camp Pendleton to 84 percent of standard, which equates to Combat Ready (medium threat) per Marine Corps Training and Readiness standards and a base readiness factor of B-2.
- For a MEU Battalion Landing Team, all field-training tasks can be completed to 86 percent of standard. This is based on the BLT completing tasks outside the scenario elsewhere on Camp Pendleton if necessary in order to more fully complete a specific task. This equates to Combat Qualified (high threat) and marginal B-1 for base readiness factor.

The results indicate that at the conclusion of a notional final graduation exercise for a MEU prior to overseas deployment, a point at which training readiness should be at a maximum, completion of all field-training tasks for the MEU BLT was 14 percent below Marine Corps standards due to the effects of encroachment within a segmented operational training scenario at Camp Pendleton.

Category	Non-Firing Tasks			All Field Tasks		
	Completion Percentage	Combat Readiness (Threat Status)	B-Level	Completion Percentage	Combat Readiness (Threat Status)	B-Level
AH-1W Cobra (T&R)	97%	Qualified (high)	B-1	97%	Qualified (high)	B-1
AAV Crewman (ITS)	94%	Qualified (high)	B-1	88%	Qualified (high)	B-1
Combat Engineer (ITS)	80%	Ready (medium)	B-2	85%	Qualified (high)	B-1
Mortarman (ITS)	92%	Qualified (high)	B-1	85%	Qualified (high)	B-1
Rifle Company (MCCRES)	90%	Qualified (high)	B-1	89%	Qualified (high)	B-1
Artillery Battery (T&R)	84%	Ready (medium)	B-2	78%	Ready (medium)	B-2
LAR Platoon (T&R)	77%	Ready (medium)	B-2	75%	Ready (medium)	B-2
MEU BLT	89%	Qualified (high)	B-1	86%	Qualified (high)	B-1

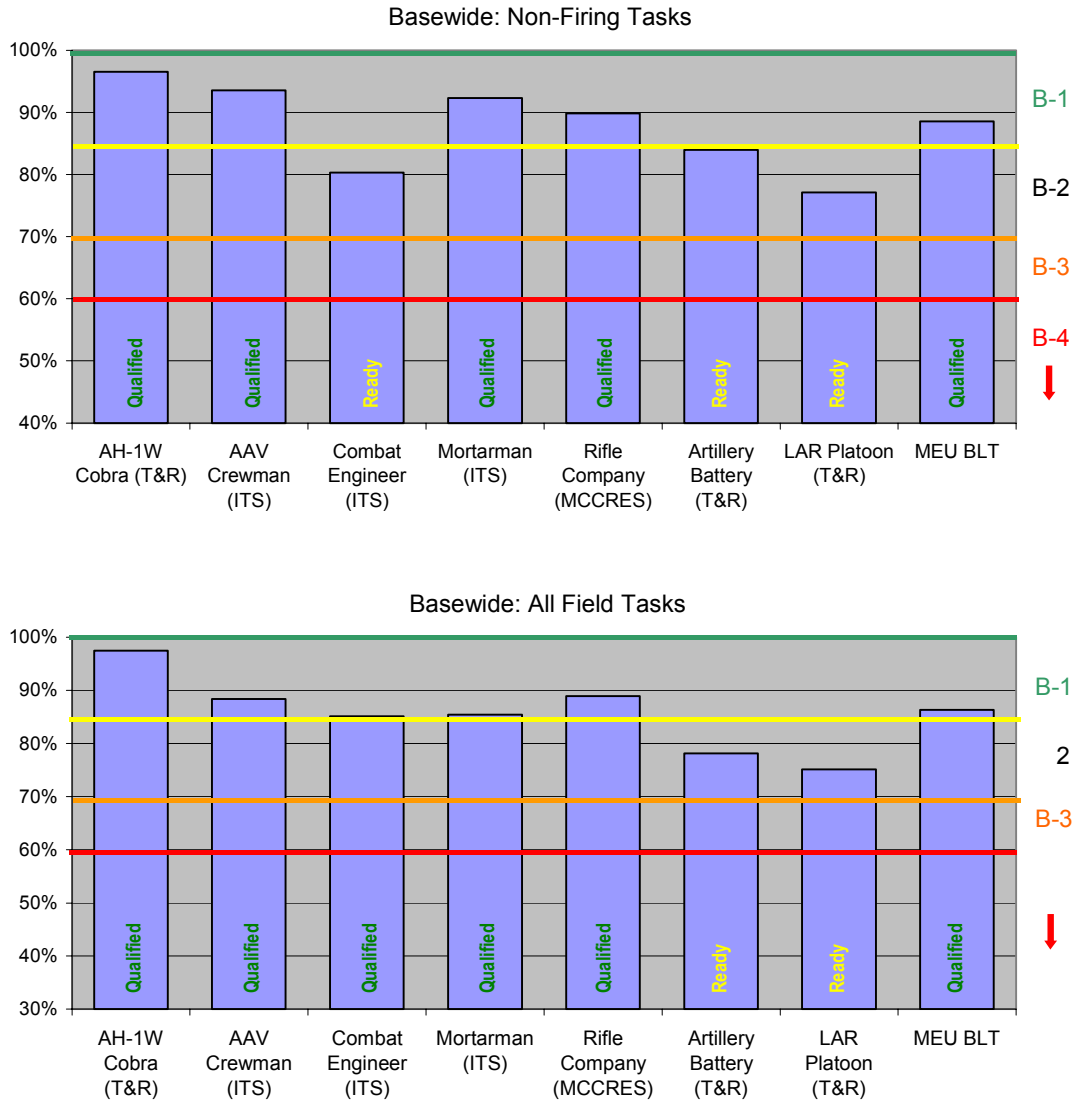


Figure 14. Base-wide Operational Scenario Results

(5) Encroachment Factors

For each training task that cannot be fully completed to standard, the SME was asked to identify encroachment or safety factors that inhibit the completion of the task, if applicable. The frequency of occurrence of encroachment factors in each assessment category is presented in the detailed results summaries in Appendices E and F. A summary and ranking of the encroachment factors that impacted training tasks in the Red Beach scenario are presented in figure 15. Base-wide encroachment summary and ranking are displayed in figure 16.

The encroachment factor that impacts training tasks most frequently in every case in both in the Red Beach scenario and base-wide is threatened and endangered species and their habitat. Wetlands and cultural resources are close behind endangered species in their impact on training. These three factors account for 75 percent of the encroachment impacts for non-firing tasks and for approximately 60 percent of the encroachment impacts for all field-training tasks both in the scenario and base-wide. Other encroachment factors impacting training to a measurable but lesser degree include: land use, airborne noise, airspace restrictions, water use, and urban growth.

Safety—public and training—also impacts the completion of training tasks. While not considered an encroachment factor, safety is included in the totals in figures 15 and 16 to provide a complete picture of the factors affecting training.

(6) Inhibited Activities

Certain types of Marine activities in the field are consistently impacted or inhibited by encroachment factors. The most common include digging (e.g. fighting positions, vehicle defensive positions, artillery and mortar positions), earth moving (e.g. berms, revetments), off-road foot and vehicular movement, noise (artillery firing, bombing, helicopter flying), and airspace use (aircraft, artillery, mortars).

C. Quantitative Results—Base Training Areas

A spatial analysis of the training areas, using Geographic Information System (GIS) technology and the Camp Pendleton GIS database, identified the amount of training space with restrictions to training (figure 17). The analysis of the 33 base training areas, including Red and White beaches, found that every one of the training areas has some type of terrestrial restriction on training. These restrictions included such factors as the presence of endangered species, rare plant/cultural resource locations, vernal pools, critical habitat, and other designated environmentally sensitive areas. The total amount of restricted land space at Camp Pendleton is 16,111 acres or 23.2 percent of training areas, not including the impact areas that are restricted due to safety concerns. A more detailed analysis of specific encroachment factors found that endangered species restrictions cover 12,493 acres or 18.0 percent of the training areas, wetlands restrictions cover 979 acres or 1.4 percent of the training areas, and cultural resource restrictions cover 670 acres or 1.0 percent of the training areas.

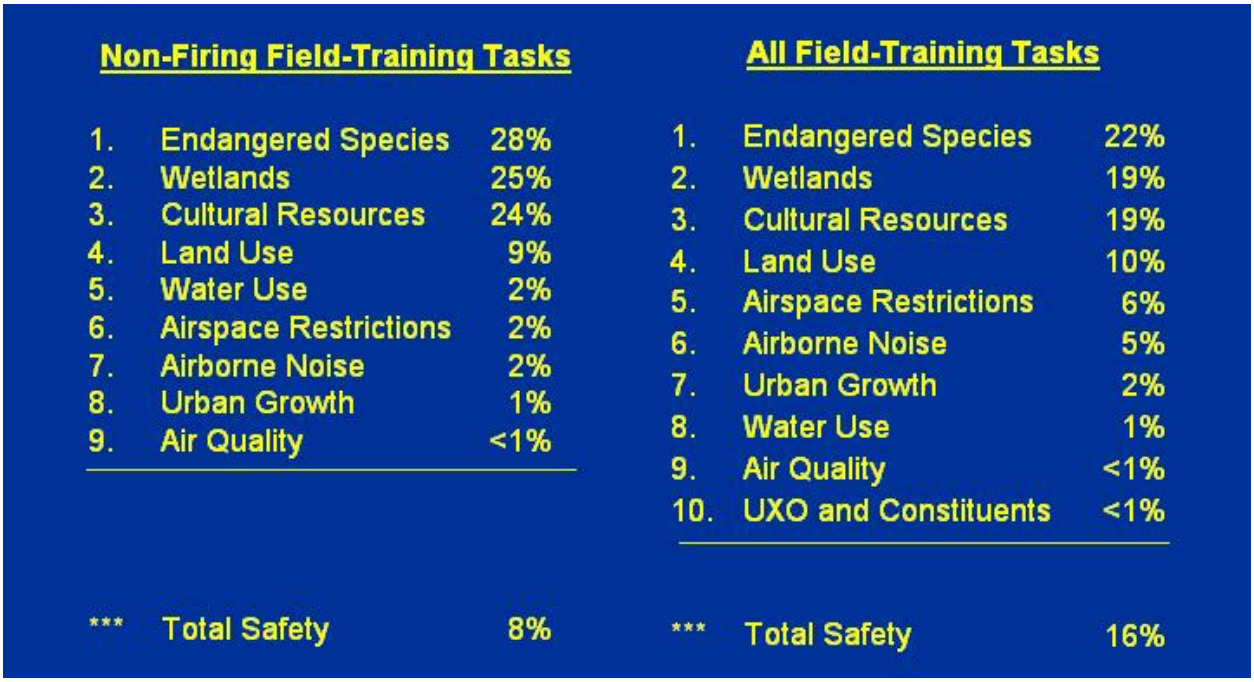


Figure 15. Encroachment Factor Summary: Red Beach Scenario

Figure 16. Encroachment Factor Summary: Base-wide Scenario

Encroachment Factor	Number of Training Areas with Restrictions (#)	Total Area of Training Areas with Restrictions (acres)	Percent of Training Areas with Restrictions (%)
Rare Plant and Cultural Resources	24 of 33	669	1.0%
Endangered Species	28 of 33	12494	18.0%
Wetlands	13 of 33	979	1.4%
Total for all Training Restrictions	**33 of 33**	**16111**	**23.2%**

Figure 17. Results of GIS Analysis of Base Training Areas

D. Additional Subject Matter Expert (SME) Comments and Observations

During interviews, SMEs provided comments and observations in addition to their quantitative assessments. Comments relevant to encroachment included:

(1) Several SMEs who had trained at Camp Pendleton in previous years observed that there are many more restrictions on training activities at Red Beach, and elsewhere on the base, compared to the 1970s, 1980s, and even the early 1990s.

(2) Marines at Camp Pendleton are not digging fighting positions anymore as a matter of routine field discipline due to environmental restrictions.

(3) Company Commanders do not have the opportunity to make realistic tactical decisions in the field because of restrictions due to encroachment.

(4) Because encroachment limits battalion-sized amphibious landings to Red Beach, Marines encounter the same terrain and same features in every exercise. The lack of variety, despite 17 miles of beach at Camp Pendleton, results in reduced training realism and value.

(5) The lack of realistic tactical action in field training embeds bad habits in Marines that must later be corrected on the battlefield or during real-world operations.

(6) Simulated opposition force (OPFOR) actions are very restricted in options and variety due to encroachment restrictions. The impact of encroachment is depicted in Appendix G, which shows a notional, but tactically sound, enemy defensive configuration for a defended Red Beach overlaid with restricted areas. Even if the OPFOR could be properly placed, the Marines coming ashore could not execute appropriate tactical actions due to restrictions at Red Beach. The result is that the amphibious landing training environment is not realistic. Another factor contributing to a lack of realism is that the OPFOR will often create their defensive positions anchored on restricted areas knowing the landing force cannot enter those areas.

(7) The restrictions at Camp Pendleton on off-road operation of Logistics Vehicle System (LVS) results in inexperienced drivers and increased accidents when LVS must be operated off-road elsewhere.

(8) Field training 24 hours around the clock at Camp Pendleton is limited by: aircraft divert field availability; airborne noise at night; and airspace limitations after midnight.

(9) Ambient light levels, on and off the base, degrades night vision device (NVD) use and training at Camp Pendleton. This is a critical skill needed in combat and an example of encroachment from urban growth and development.

(10) Laser (target designators) training areas are very limited and not adequate to support required training. This is a public safety issue and an example of encroachment from urban growth.

(11) Emission Condition Alpha (EMCON A) is a tactical condition which specifies that light radar, and communications transmissions from ships and aircraft be turned off to deny an enemy information on location. EMCON A should be set for the amphibious ships, landing craft, and supporting aircraft during an amphibious landing. For public safety, EMCON A cannot be set and maintained during operations off Camp Pendleton. This is an example of encroachment due to urban growth.

(12) A Reverse Osmosis Water Purification Unit (ROWPU) should be setup on the beach and operated by the CSSE to provide water to the BLT. The operation can only be simulated due to the use of citric acid to flush the ROWPU prior to operation. As a result of Clean Water Act restrictions, Marines do not get realistic and complete training on the operation of the ROWPU in a tactical scenario.

6. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions from the Analysis

(1) *Encroachments have a measurable negative impact on field training at Camp Pendleton.* All field training assessed at Camp Pendleton is affected to some degree. Ground activities and tasks are impacted the most. A Battalion Landing Team is able to complete the required non-firing tasks of a four-phase amphibious landing scenario to less than 68 percent of the Marine Corps standard. Camp Pendleton's ability to provide an optimal training environment for Marines preparing for worldwide deployment is significantly degraded by the effects of encroachment.

(2) *Realistic training is significantly degraded within prime maneuver corridors, training areas and training beaches at Camp Pendleton due to encroachments.* On Camp Pendleton, combat and logistics support training is very difficult to accomplish in a tactically realistic manner in virtually every training area, including tactical actions on and in the vicinity of the beach and in primary mounted maneuver corridors. One of the purposes of advanced training is to exercise a unit leader's ability to respond to conditions and situations in a developing event. For example, the completion factor for MEU and BLT non-firing training tasks at Red Beach is 66 percent of the Marine Corps standard. Marines describe training actions on the beach as "administrative" rather than tactical. This is one of many compelling negative examples of the Marines' inability to "train as they will fight". Other examples include LAR platoon training (54 percent of standard for non-firing tasks in scenario), due to restrictions on off-road maneuver and restrictions on digging that affect multiple units and MOSs in their ability to prepare field fortifications and fighting positions. While the base presently supports substantial training base-wide, unit training requirements often require a pre-approval process that causes delays and invokes prescriptions as to how and where those activities can be accomplished. Thus, encroachments drive training that is segmented in time, duration, and context, which diminish considerably the essential aspects of realism. It is analogous to preparing for a football game without wearing pads, without practicing plays at full speed or testing the flow of the game plan, and without a capable taxi squad simulating the opposition.

(3) *The type of training that is required to prepare Marine Corps MAGTFs for deployment and combat is also the type of training that is most affected by encroachments at Camp Pendleton.* The study outcomes indicate that the higher and more complex the task or requirement- the greater the impacts of encroachment. It follows that the more complex the unit/organization- the greater the impacts of encroachment. The negative effects of encroachments on training are evidenced most acutely in the context of combined arms training. While individual and small unit training are demonstrably impacted, those activities that involve complex tasks, larger units, sophisticated coordination requirements for multiple maneuver elements, and/or are equipment intensive, are subject to the greatest impacts from encroachments. Advanced training in a fluid, continuous tactical scenario is the type of training a Marine unit would receive immediately prior to deployment but also is the type of training that is most degraded by encroachments.

(4) *The types of individual and unit training activities most inhibited by encroachment include digging, earth-moving, and off-road foot and vehicular movement.* A consistent theme in the analysis is that driving and maneuvering vehicles off-road is severely constrained by

encroachments. Another consistent theme is the broad constraint on requirements for individuals to dig fighting positions, units to dig (lay-in) defensive positions, gun emplacements, vehicle defilades, and for combat engineer training in earth moving and vehicle recovery. These activities are fundamental skills and critical components of both offensive and defensive combat tactics. Off-road training by ground vehicles—LAVs, AAVs, bulldozers, etc.—increases the possibility of disturbance of protected natural and cultural resources, which leads to greater restrictions on military land uses, and hence limits the ability to complete required training tasks Though restricted by encroachment factors, training tasks involving foot movement and maneuver, such as by a Rifle Company, can generally be completed to a higher degree than training with mechanized units.

(5) *Unit commanders attempt to "workaround" training shortfalls to compensate for adverse effects of encroachments; the ability of such segmented training to successfully achieve unit readiness objectives is important to understanding and relieving encroachment impacts on combat readiness.* When training cannot be completed at Camp Pendleton, the necessary training objectives must nevertheless be accomplished. While virtual or constructive approaches can provide value, Marine Corps training doctrine mandates a high proportion of field training to achieve and maintain combat readiness. Where the capability of Camp Pendleton to support training is degraded due to encroachment, unit commanders can seek to accomplish training in some other way (e.g., on a base-wide rather than in-scenario basis) or at a different location, such as Twentynine Palms. However, training conducted outside a continuous tactical iteration yields a segmented and less effective result. Reliance on training at other ranges results in increased costs, is time consuming, and leads to additional deployed time away from home for Marines. Moreover, training events that are displaced from Camp Pendleton by encroachment may be difficult to accommodate at another base or range. Twentynine Palms, for example, is: (1) very heavily used both by units stationed there and by visiting units involved in Combined Arms Exercises; and (2) addressing encroachment concerns of its own. Workarounds for training displaced by encroachment are costly, may not provide high training value, and are becoming increasingly difficult to schedule and implement. This analysis could be particularly important as ranges are being closed (lost) both within CONUS and worldwide. The ability of existing ranges to support training readiness requirements is important to understanding the availability and adequacy of facilities to support current and future workarounds. The scope of this study required only identification of tasks that require commanders to pursue alternatives to accomplishment at Camp Pendleton. The methodology to quantify the impacts generated by "workarounds" has not been fully developed. Recommendation (4) applies.

(6) *Regulatory restrictions on impacts or potential impacts to natural and cultural resources constitute the primary encroachment factors most affecting the capability of Camp Pendleton to accommodate necessary military training.* Protections imposed to conserve endangered species and their habitats yield the greatest adverse impacts on training. The analysis in this assessment confirms the Marine trainers' and operators' anecdotal experiences that the Endangered Species Act and its implementing regulations impose the most significant impacts on training activities. Such impacts are manifest in various ways, from actual restrictions on the training activities themselves to time delays and resource expenditures associated with the consultation process to gain approval and/or permit of certain training activities. Wetlands protections and cultural

resources regulations pose similar conditions and are highlighted as additional areas of very significant concern.

(7) *Field training at Camp Pendleton is more restricted today than it was 20 years ago.* Marines who trained at Camp Pendleton and Red Beach in the 1970s and 1980s report that restrictions on training have increased markedly and that today's training is much less realistic. Over the past several decades, there clearly has been a "net loss" of Camp Pendleton's capability to support combat readiness training requirements. The factors that have precipitated this circumstance are a matter of concern for the current and future readiness posture of units operating on and deploying from the Base. Follow on quantification efforts will be important to establishing a trend line to facilitate the monitoring and intervention process. To that end, the accompanying database application has been developed to assist the Base and the major subordinate commands of I MEF in conducting future assessments.

(8) *Urbanization is the principal underlying factor to the other categories of encroachment*. Every category of encroachment assessed in this analysis—whether increased regulatory attention to endangered species or wetlands protections; tighter air quality rules, community noise concerns, etc.,—can be directly or indirectly attributed to urbanization as the root cause. As a result of urbanization, the consumption and depletion of regional biodiversity, increases the value of the remaining inventories of these resources, of which the largest blocks are often found on federal lands such as Camp Pendleton. The result is increased regulatory oversight and pressure to manage the Base's lands to support conservation goals rather than military training requirements.

B. Recommendations regarding possible Future Encroachment Assessments

Metrics that relate range/training area capabilities and limitations to doctrinal training requirements are an integral part of the Marine Corps Range Management System. This study serves as a proof-of-principal for developing these metrics. As such, this study was limited in scope; however, the Marine Corps may apply this approach to additional training ranges and military training requirements. To facilitate future application of the methods developed in this study, the following recommendations are provided.

(1) *When assessing the impacts of encroachment on the completion of training tasks, the highest fidelity can be achieved by drilling down to the individual standards that comprise a single overall task.* In this study, MEU BLT training was assessed using MCCRES standards, which break down a tactical task, such as conducting an amphibious assault, into smaller component tasks with associated standards. Assessment of the ability to complete the component tasks to standard provides a highly refined measure of encroachment impacts. Use of MCCRES standards, where available or applicable, is the preferred approach to quantification of mission impacts.

(2) *Training task-level encroachment analysis should focus on the unit level and include a MAGTF, MAGTF component, or combined unit training.* As noted in the Conclusions (See (3), above) the capability of the base to support MAGTF-level training is the best indicator of overall base functionality, because this type of training is required prior to deployment, and is also most

impacted by encroachment. Future analysis should focus on MEU aspects of unit-level training. Assessment of MAGTF or MAGTF-component training offers the most cost-effective use of limited resources while providing a quantitatively useful measure of encroachment impacts on installation capabilities.

(3) *Future assessments should consider not only the ability of the installation to support completion of a task, but the impacts of encroachment on the training value obtained by task completion in a degraded training environment.* The impacts of encroachment are insidious because displaced training is conducted in a manner and location that is progressively less optimal. Some tasks may be completed in a segmented fashion, but encroachment may nevertheless impact training value. Moreover, because in-scenario training is the preferred approach, particularly for MAGTF training, a straight comparison of the operational and base-wide completion factors for the same task can be misleading. Consideration should be given to assessing the impacts of encroachment on the training value of a task, in addition to the physical ability to complete the task. Consideration also should be given to assessing the discounted training value of performing some tasks ex-scenario, even if such can be competed base-wide. In order to more precisely assess the impacts of encroachment on training value, specific definition of the numerical scale used for task completion to standard should be considered.

(4) *The impacts of encroachment on training should be considered in a regional context to include the cumulative and indirect impacts of encroachment.* Marine Corps training requirements in the southwest are supported by several installations, ranges and training areas in addition to Camp Pendleton, including facilities at MAGTFTC 29 Palms; Yuma Ranges (Barry M. Goldwater West and Chocolate Mountains Gunnery Range); MCAS Miramar; San Clemente Island Range Complex; and MWTC Bridgeport. When encroachment inhibits effective training at Camp Pendleton, the required training might be pursued at another Marine facility. This could result in significant impacts including: additional costs; increased personnel tempo and time away from home for Marines; and scheduling and capacity issues at other installations. This assessment did not capture regional impacts. Identifying and quantifying them would require a regionally comprehensive approach because:

- the impacts affect a variety of units, commands, schools, and installations;
- the impacts have different types of measures including dollars, time, and opportunity costs due to effects on scheduling; and
- impacts analysis would need to assess the capabilities, current and future uses, and training capacity of possible alternative training venues.

C. Observations regarding the Assessment Process

(1) Though urban growth is the primary factor behind most encroachment, other factors that were caused by urban growth were the ones generally identified by SMEs as a reason for not completing a task to standard. The SMEs recognized the symptoms of urban growth as impacting training. Though under valued in this assessment as an explicit causative factor, the impacts of urban growth were manifested in the other encroachment factors.

(2) Interview sessions with several SMEs generally provided greater insight into the encroachment impacts and more refined numerical assessments than when only one or two SMEs were present.

7. SUBJECT MATTER EXPERTS

Subject matter experts (SME) that contributed to this assessment are listed by billet below:

Battalion Landing Team:
S-3, 15th Marine Expeditionary Unit (MEU)
Fire Support Officer, 15th MEU
Staff G-3, 1st Force Service Support Group (FSSG)
Staff G-4, 1st FSSG
Officer-in-Charge, Special Missions, Special Operations Training Group (SOTG)
XO, Company B, 1st Transportation Support Battalion

Rifle Company:
Assistant G-3, 1st Marine Division
Staff, Marine Corps Base (Ops and Training)

Mortarman MOS:
Staff S-3, 1st Marine Regiment
Weapons Company Commander, 2nd Battalion, 1st Marine Division

Combat Engineer MOS:
Staff G-3, 1st Force Service Support Group
Charlie Co. Commander, 1st Combat Engineer Battalion

AAV Crewman MOS:
Training Chief, 3rd Amphibious Assault Battalion, 1st Marine Division

Artillery Battery:
S-3A, 11th Marine Regiment
Staff G-3 (Training), 1st Marine Division

LAR Platoon:
S-3, 1st LAR Battalion

AH-1W Cobra:
Staff G-3, First Marine Expeditionary Force (I MEF)

8. LIST OF PREPARERS

Sponsor:

Stan Norquist
Head, Natural Resources
A/CS Environmental Security
Camp Pendleton, CA 92055
(760) 725-9754

Principal Investigators:

David Hearding
SRS Technologies, Inc
1401 Wilson Blvd., Ste 1200
Arlington, VA 22209
(703) 351-7233

Dr. RG Head
SRS Technologies, Inc
1401 Wilson Blvd., Ste 1200
Arlington, VA 22209
(703) 351-7240

Database Developer

Ryan Heitz
SRS Technologies, Inc.
1401 Wilson Blvd., Ste 1200
Arlington, VA 22209
(703) 351-7249

Appendix A

Data Collection Interview Procedure

MCB Camp Pendleton Encroachment Assessment
SME Interview Procedure

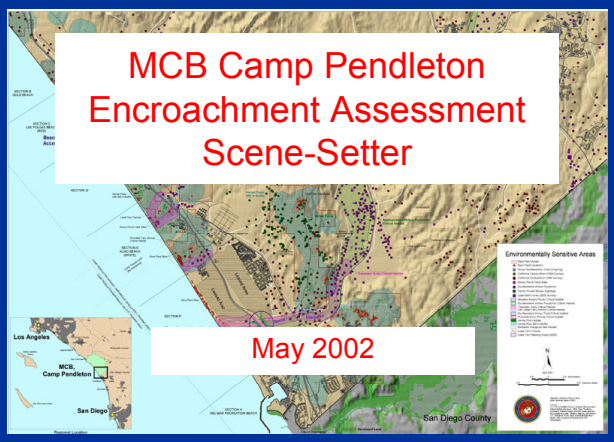
Interview/Data Collection Items:

1. Record names/billets of Subject Matter Experts (SMEs).
2. Short "scene-setter" brief to provide context.
3. Review spreadsheet layout.
4. Identify source documentation for tasks.
5. Review operational scenario.
6. Explain that assessment will be in two parts:
    a. Ability to accomplish task within the scenario.
    b. Ability to accomplish the task somewhere at MCB CP.
7. Discuss grading criteria for task accomplishment.
8. Request SMEs consider temporal impacts on tasks such as:
    a. Breeding seasons;
    b. Day vs. night; and
    c. Fire season.
9. Review each task, including standards and conditions and request SME to numerically assess accomplishment and identify primary factor(s) inhibiting 100 percent completion.
10. Highlight key indicator tasks (if applicable).
11. If task is purely administrative (and doesn't require a range or training area), note in designated block.
12. Add explanatory notes as appropriate in block on spreadsheet. **INCLUDE** *type of activity that results in environmental or other "insult" (e.g. digging, off-road maneuver, airspace restrictions, etc.)*.
13. If a task cannot be accomplished at MCB CP, **INCLUDE** in comments section (1) where the training is done instead; (2) whether size of unit is a factor (i.e. can train a platoon but not a battalion.

Appendix B

Scene-Setter Brief

MCB Camp Pendleton Encroachment Assessment Scene-Setter



May 2002

- Tasking
- Situation
- Mission/Commander's Intent
- Specified/Implied Tasks
- Concept of Operational Analysis
- Analysis Framework
- Forces to be Assessed
- Analysis Scenario
- Analysis Increments

2

- MCB ability to support 1st Marine Div battalion-level live-fire training has deteriorated in recent years;
- Factors include:
  - Newer weapons systems with greater range/destructive effect;
  - Increased emphasis on mobility and mounted maneuver;
  - Environmental restrictions create large avoidance areas;
  - Local airspace restrictions on artillery/mortar live-fire.
- Impacts:
  - Reduces available training days;
  - Reduces range/training area usage;
  - Reduces realism;
  - Increases complexity in planning training.

3

Mission and Commander's Intent

- Mission: Assist MCB Camp Pendleton in quantifying the impacts of encroachment on the mission of training Marines for combat.
- Commander's Intent: Use analysis to support outreach efforts with Congress, regulators, interest groups, and public. The purpose is to enhance the ability and capability of MCB Camp Pendleton to train Marines for combat.

4

- Specified Tasks:
  - Develop methodology to quantify the impacts of encroachment at MCB on training requirements;
  - Develop metrics to measure impacts relative to combat readiness;
  - Develop materials to support outreach by MCB;
  - Develop database application to facilitate analysis and future quantification efforts.
- Implied Tasks:
  - Identify units, weapons systems, and occupational fields for analysis;
  - Identify operational scenario;
  - Identify operational tasks to be assessed;
  - Survey/interview Marine operators as to ability to complete identified operational tasks at MCB;
  - Analyze results of the survey.

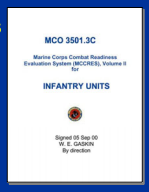
5

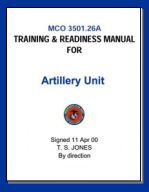
- Use a single continuous operational scenario which has several phases and employs a variety of weapons systems.
- Break down the operation into:
  - Tasks (MPS) for the overall campaign;
  - Tasks (T&R events) for individual weapons system;
  - Tasks (ITS) for individual occupational field.
- Interview Marine Subject Matter experts (SME) to quantify degree to which each individual operational task can be completed at MCB.
- For each task not able to be fully completed, determine primary (encroachment) factor(s) inhibiting completion.
- Output = (1) quantification of analyzed tasks which can and cannot be completed at MCB;
  (2) quantification of the encroachment factors inhibiting training at MCB;
  (3) identify workaround locations for tasks that could not be satisfactorily completed at MCB.

6

Primary References

- MCO 3501 Series
  - Marine Corps Combat Readiness Evaluation System (MCCRES)
  - Training and Readiness Manuals
- MCO 1510 Series
  - Individual Training Standards





7

Encroachment Factors

ENVIRONMENTAL

- Air Quality – Clean Air Act requires control of emissions commonly generated on an installation. Opacity regulation may impact ranges by restricting or prohibiting smoke training and mounted maneuvers.
- Cultural Resources – presence of archaeological sites where ground activity is prohibited.
- Ecosystem/biodiversity – protection of an ecosystem in order to preserve a particular biota. Potential to impact even in the absence of endangered species.
- Endangered Species – Endangered Species Act protects threatened or endangered species by designating "habitat". By law, it is illegal to "take" a listed species to include significant habitat disturbance. Impact on ranges is restrictions on ground activity in or near habitat.

8

Encroachment Factors (cont.)

- Maritime Sustainability – 7 different regulatory programs; Marine Mammals, Essential Fish Habitat, Coastal Zone Management are examples; impacts include restrictions on use of explosives in the water and activities potentially affecting otters, sea lions, whales and dolphins.
- Water Use – Clean Water Act and Safe Drinking Water Act regulate pollutants that are introduced to the environment. Potential impacts on munitions and liquid discharges.
- Wetlands – required to minimize wetlands degradation by EPA and Army Corps of Engineers; may impact ground activities.

9

Encroachment Factors (cont.)

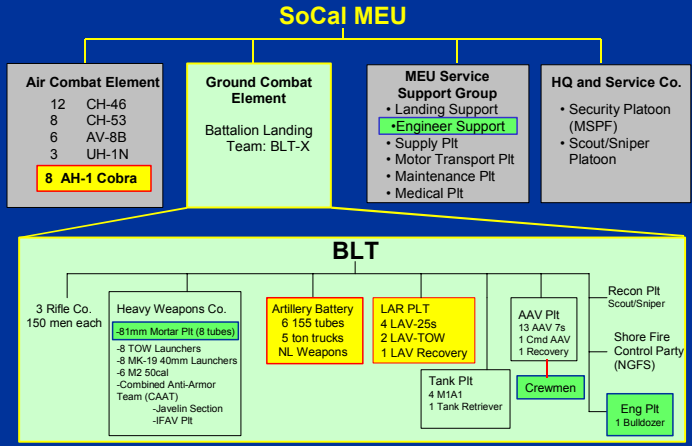
MANMADE

- Airborne Noise – National Environmental Policy Act (NEPA) compliance and community pressure; impacts on military activities including aircraft, helos, artillery, mortars, tank guns, bombs, missiles.
- Airspace Restrictions – Special Use Airspace required to conduct military training; commercial airspace requirements are growing. Lack of SUA may impact military activities including flying and firing artillery or mortars.
- Frequency Encroachment – military requires portions of the RF spectrum; DoD has lost 27% of the total spectrum allocated for aircraft telemetry.

10

- Land Use – incompatible and competing uses of land, either inside or outside the base fence line, which are not related to urban growth.
- Urban Growth – population growth and development near military installations that may be incompatible with the installation's training mission.
- UXO and Constituents – 4 Federal regulations; generally applies to closed ranges, but an active range have been closed or threatened to close as the result of UXO impacts on the environment.

11



12

Forces to be Assessed

→ Units:
- MEU/Battalion Landing Team (4 Phase Operational Scenario)
- Rifle Company (across all tasks – ex-scenario)

→ Weapons/Equipment (using Training and Readiness Manuals):
- LAR Platoon
- Artillery Battery
- AH-1W (Cobra)

→ Occupational Fields (using Individual Training Standards):
- 0341 Mortarman
- 1371 Combat Engineer
- 1833 AAV Crewman

13

Four Phase Operation Conducted by a Battalion Landing Team:

– Phase I – Amphibious Assault
Red Beach

– Phase II – Movement to Contact
Via Las Pulgas Canyon

– Phase III – Deliberate Attack
Artillery bombardment
Armor/infantry attack

- Phase IV – Sustainment

14

10	=	Fully Combat Qualified
9	=	Combat Qualified (High Threat)
7-8	=	Combat Ready (Medium Threat)
6	=	Combat Capable (Low Threat)
< 6	=	Not Combat Capable

Ref: based on MCO 3501.26A

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Appendix C

The Training and Range Encroachment Information System (TREIS)

1.0 INTRODUCTION

An important part of the Camp Pendleton encroachment quantification study is the development of a database tool, named the Training and Range Encroachment Information System (TREIS). The purpose of the TREIS is to build upon the data collection and analysis methods from the encroachment quantification study and provide an easy to maintain tool to collect additional data, perform analysis, and generate reports. The TREIS also represents a prototype solution for collecting and quantifying encroachment impacts that has the potential to be applied to other USMC ranges and bases.

Based on interviews with Camp Pendleton staff, a set of functional requirements was developed to guide the database design and development process. The primary functions that the TREIS is required to perform can be organized into three categories:

1) Managing Information. The TREIS is required to manage the information collected during the encroachment quantification study.

2) Reporting. The TREIS needs to provide reports that quantify encroachment impacts to training and ranges/training areas.

3) Data Collection. The TREIS is required to provide an expandable architecture that supports future data collection and analysis.

To accomplish these tasks, the TREIS uses a powerful relational database and GIS technologies to link training tasks, Camp Pendleton training areas, and encroachment factors. The database builds upon the methodologies that were developed as part of encroachment quantification study. The TREIS physically resides at Camp Pendleton and supports indirect links to the Base GIS database, USMC Training Task References, and the Camp Pendleton Range and Training Regulation. In addition, the TREIS uses standard database formats that would allow it to be easily linked to RFMSS.

2.0 ORGANIZATION

The TREIS is organized so that processes originate from the main menu (figure C-1) and can flow into one of three modules:
1) Training Tasks
2) Training Areas and
3) Encroachment Factors

Section 3.0 provides an overview of some key features of each of these modules. Please refer to the TREIS Reference Manual and Requirements Document for a more detailed description of the database interfaces and functions.

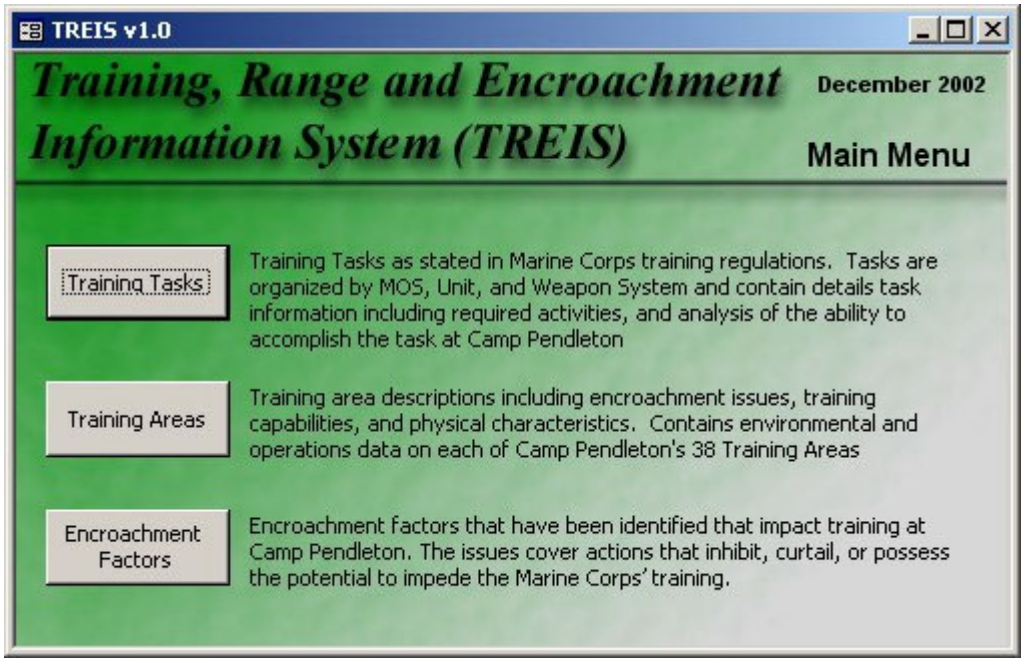


Figure C-1. The TREIS Main Menu

3.0 TREIS MODULES

TRAINING TASKS ANALYSIS MODULE

The focus of the Training Tasks Analysis Module is the collection, analysis, and reporting of encroachment impacts to training at Camp Pendleton. The collection of data is handled by a series of interfaces that allow the user to select the:

- Force or system to be analyzed;
- Time period of the analysis; and
- The training areas or scenario to be analyzed.

Figure C-2 shows a sample screen from the Training Tasks Module of the TREIS. On this screen the user can select a range user and review/update the encroachment analysis, access detailed task descriptions and scores, sort tasks based on key fields, view a summary of the tasks by type, and print reports on encroachment impacts.

The key features of the Training Tasks Analysis Module are the ability to:

- Assess encroachment impacts on individual units, weapons systems or occupational fields in the context of a user-created operational scenario (e.g. the Red Beach Scenario) or in the context of all base training areas.
- Add new units, weapon systems, or occupational fields and analyze encroachment impacts for them.
- Generate a new operational scenario for which to create an assessment of encroachment impacts.
- Create a new encroachment analysis for a force or system, in a selected scenario, at a different point in time.

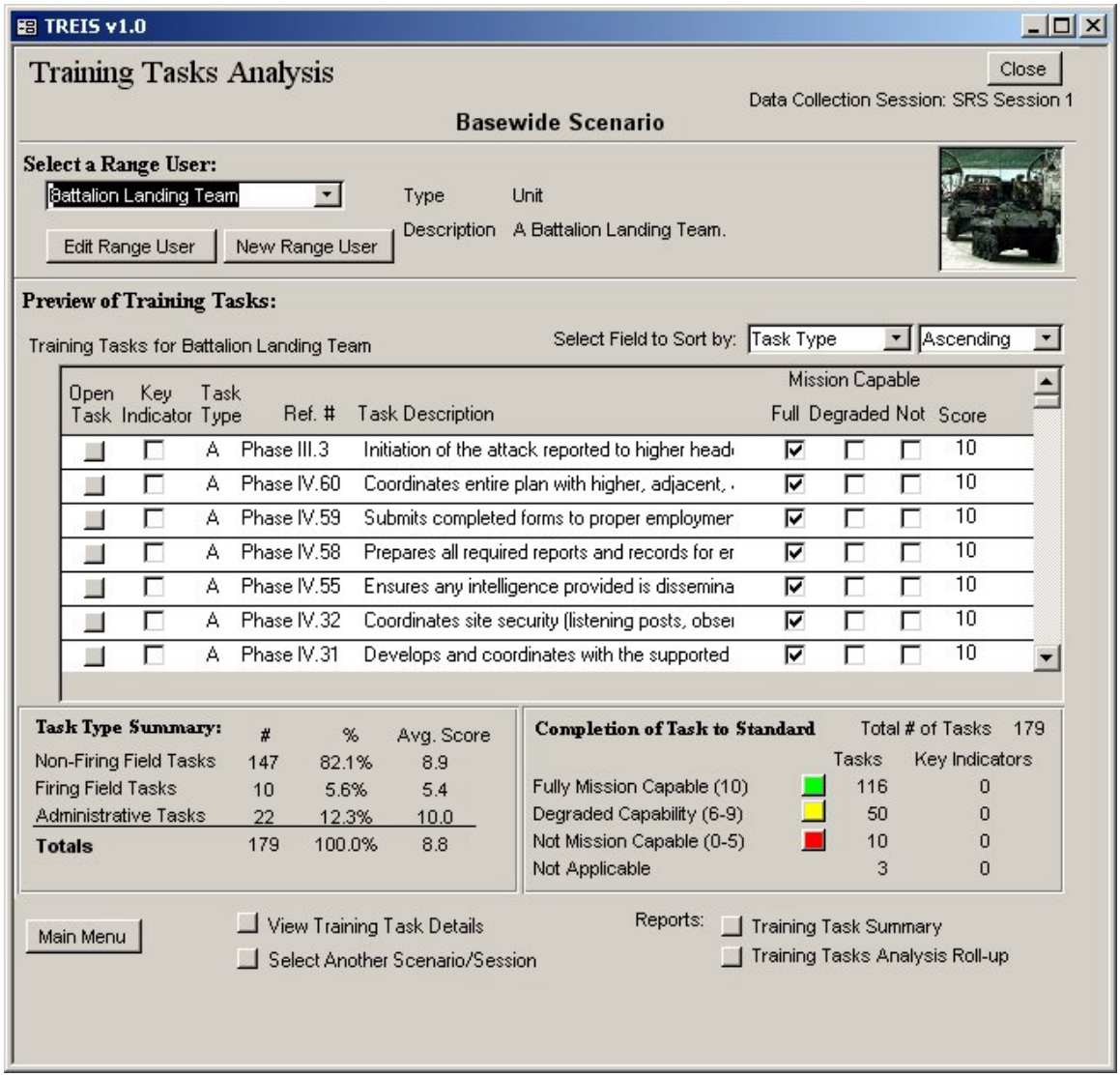


Figure C-2. An example screen from the Training Tasks Analysis Module

TRAINING AREA ASSESSMENT MODULE

The Training Area Assessment Module is focused on assessing the impacts of encroachment on the Camp Pendleton training areas. This module uses a detailed set of GIS data layers to calculate the amount of restrictions on the training areas. In addition, this section of the TREIS provides summaries of the operational usage and natural resources for each training area.

Figure C-3 shows an example screen from the Training Area Assessment Module. From this interface users can view detailed information on the training area, including GIS statistics on training restrictions (e.g. the area containing endangered species), a list of encroachment factors degrading training, and maps and aerial photographs of the training area.

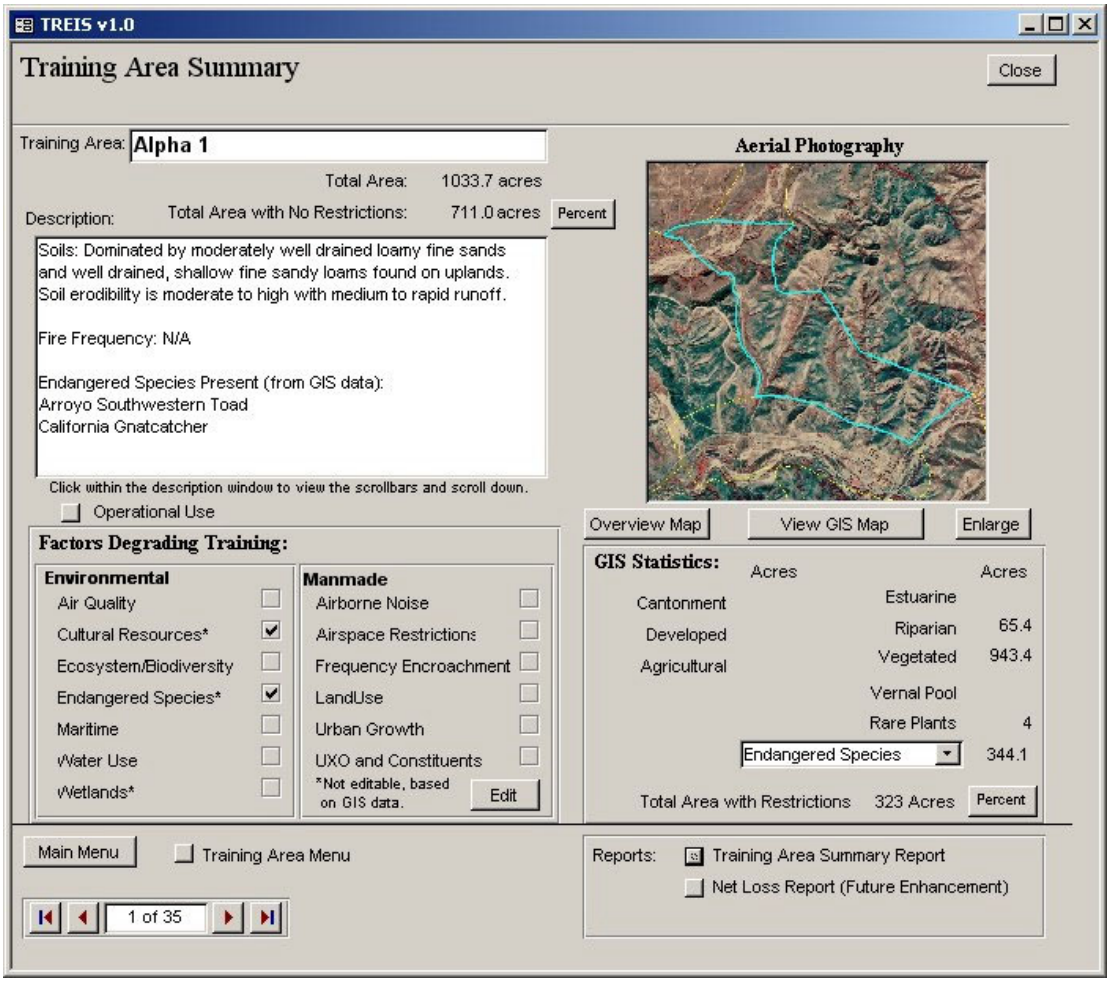


Figure C-3. An example screen from the Training Area Assessment Module

The key features of the Training Area Assessment Module are the ability to:

- Browse information on training area operational usage, natural resources, encroachment issues degrading training, and GIS calculations of acres with training restrictions;
- Print reports summarizing the training restrictions, natural resources, and operational usage of the training areas; and
- View GIS maps and aerial photographs of the training area and the restrictions.

ENCROACHMENT IMPACTS ANALYSIS MODULE

The Encroachment Impacts Analysis Module is focused on examining the effects that each encroachment issue has on the ability of range users to accomplish training tasks and the amount of restrictions on the training areas. This module uses the relationships established in the database to summarize the encroachment impacts by each encroachment issue.

Figure C-4 shows a sample screen from the Encroachment Impacts Analysis Module of the TREIS. This screen provides users with detailed information on encroachment impacts to base training areas and the accomplishment of training tasks within operational scenarios, including a summary, by time/date and operational scenario, of the training tasks that are degraded and a GIS analysis of the restricted training areas.

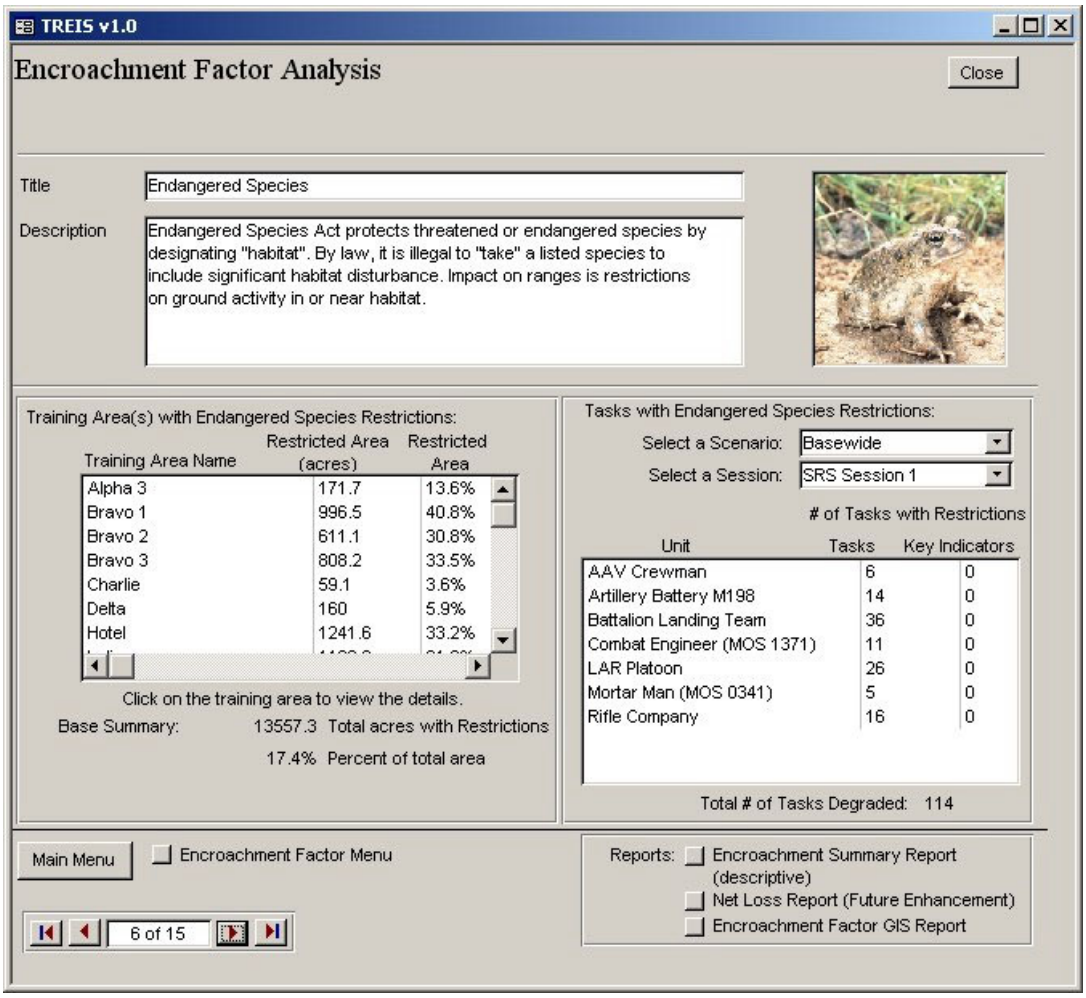


Figure C-4. An example screen from the Encroachment Impacts Analysis Module

The key features of the Encroachment Impact Analysis Module are the ability to:

- View the amount of training space with restrictions for each encroachment factor.
- View the training tasks that are degraded by an encroachment factor for various time periods and operational scenarios.
- Print reports summarizing the impacts of encroachment on training areas and the accomplishment of training tasks.
- Link from the Encroachment Analysis Module to the Training Areas and Training Tasks modules.

4.0 ENHANCEMENTS (IN WORK)

The first version of TREIS (TREIS v1.0) was successfully delivered to Camp Pendleton, Environmental Security in draft form in August 2002, with a final version to be delivered in March 2003. The TREIS v1.0 is a Microsoft Access 2000 database application that provides customized tools and interfaces to assist in data collection, analysis, and reporting. Currently, the next version of the TREIS, TREIS v2.0, is under development and will include many new features based on additional requirements that have been identified by Camp Pendleton. The

most significant additional requirements for the next version of TREIS (TREIS v2.0) are as follows:

1) Facilitate access to TREIS by making it web-accessible and more fully integrate TREIS into the Camp Pendleton, Environmental Security mission security web portal.
2) Integrate the Base GIS data with the TREIS analysis of training areas to keep the database up-to-date with regards to spatial calculations and statistics.
3) Increase the TREIS functionality to permit data collection and analysis of the training value associated with the accomplishment of training tasks and tasks identified as "Key Indicators".
4) Facilitate the ability to add new endangered species to the analysis of encroachment factors on training areas.
5) Provide increased security features, including password protection to the database so that users will have read or write access to certain portions of the database depending upon their permissions.
6) Increase the ease by which TREIS can be applied to other installations and used as a possible template for a USMC-wide encroachment quantification tool.

To meet these new requirements, the TREIS v2.0 architecture is based on a web application that uses Microsoft SQL Server as the relational database management software and ESRI MapObjects for customized GIS functions. The TREIS is designed for installation on a network server and provide simultaneous access to multiple users via a standard web browser (Microsoft Internet Explorer). The enhanced version of the TREIS v2.0 is planned for initial rollout in September 2003.

5.0 SUMMARY

The TREIS represents a powerful tool for collecting, analyzing, and quantifying the impacts of encroachment on training and readiness at Camp Pendleton. This tool allows the Base to continually assess its capability to support training at the training task level and represents a prototype tool for quantifying the impacts of encroachment on Marine Corps bases and training areas.

Appendix D

Combat Service Support Element Footprint on Red Beach

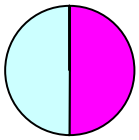
Figure D-1. Combat Service Support Element Footprint on Red Beach

Appendix E

Red Beach Scenario
Detailed Data Summaries

AH-1W COBRA

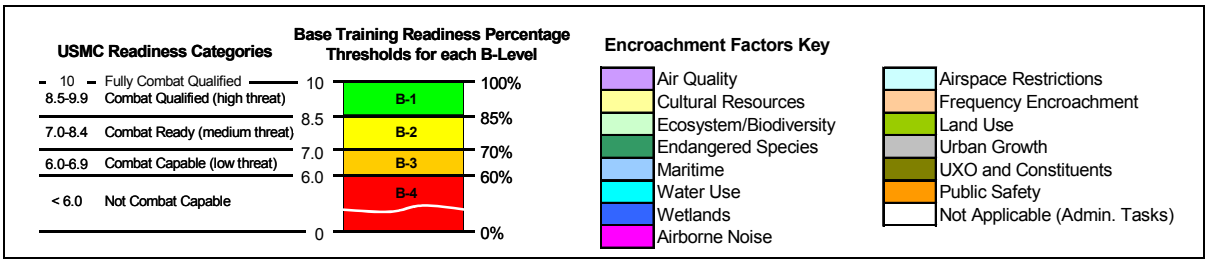
Training Tasks: In-Scenario

	# of Tasks	Percentage Completion to Standard	Base Training Readiness Level	Inhibited Activities	Encroachment Factors
All Tasks	**105**	**87%**	**B-1** Combat Qualified (high threat)	Airspace Use Noise	
Field Tasks	**67**	**79%**	**B-2** Combat Ready (medium threat)		
Non-Firing Tasks	**49**	**97%**	**B-1** Combat Qualified (high threat)		

AAV Crewman

Training Tasks: In-Scenario

	# of Tasks	Percentage Completion to Standard	Base Training Readiness Level	Inhibited Activities	Encroachment Factors
All Tasks	**117**	**89%**	**B-1** Combat Qualified (high threat)	Off-Road Maneuvers Digging Noise	
Field Tasks	**64**	**80%**	**B-2** Combat Ready (medium threat)		
Non-Firing Tasks	**58**	**88%**	**B-1** Combat Qualified (high threat)		



Combat Engineer (MOS 1371)

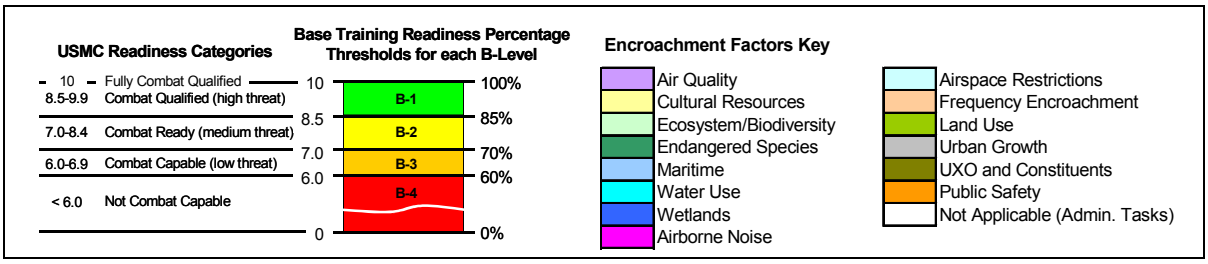
Training Tasks: In-Scenario

	# of Tasks	Percentage Completion to Standard	Base Training Readiness Level	Inhibited Activities	Encroachment Factors
All Tasks	**91**	**82%**	B-2 Combat Ready (medium threat)	Digging Airspace Use	
Field Tasks	**55**	**63%**	B-3 Combat Capable (low threat)		
Non-Firing Tasks	**37**	**78%**	B-2 Combat Ready (medium threat)		

Mortar Man (MOS 0341)

Training Tasks: In-Scenario

	# of Tasks	Percentage Completion to Standard	Base Training Readiness Level	Inhibited Activities	Encroachment Factors
All Tasks	**53**	**75%**	B-2 Combat Ready (medium threat)	Digging Airspace Use	
Field Tasks	**26**	**49%**	B-4 Not Combat Capable		
Non-Firing Tasks	**13**	**69%**	B-3 Combat Capable (low threat)		



Rifle Company

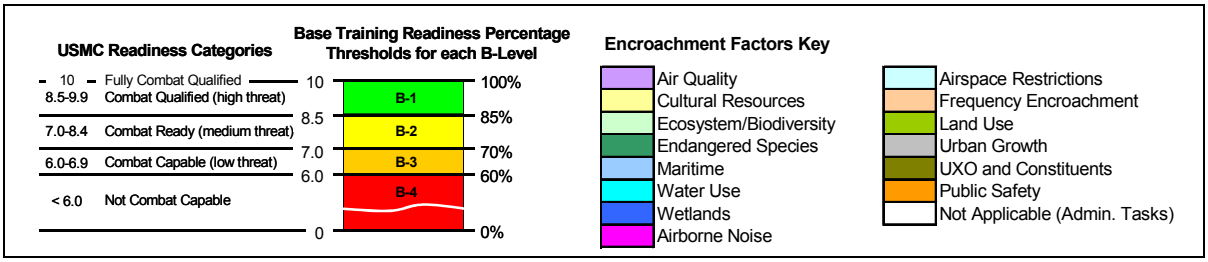
Training Tasks: In-Scenario

	# of Tasks	Percentage Completion to Standard	Base Training Readiness Level	Inhibited Activities	Encroachment Factors
All Tasks	**77**	**78%**	**B-2** Combat Ready (medium threat)	Off-Road Maneuvers Digging Smoke	
Field Tasks	**72**	**77%**	**B-2** Combat Ready (medium threat)		
Non-Firing Tasks	**64**	**80%**	**B-2** Combat Ready (medium threat)		

Artillery Battery

Training Tasks: In-Scenario

	# of Tasks	Percentage Completion to Standard	Base Training Readiness Level	Inhibited Activities	Encroachment Factors
All Tasks	**71**	**62%**	**B-3** Combat Capable (low threat)	Off-Road Maneuvers Digging Airspace Use Noise	
Field Tasks	**65**	**58%**	**B-4** Not Combat Capable		
Non-Firing Tasks	**38**	**76%**	**B-2** Combat Ready (medium threat)		



LAR Platoon

Training Tasks: In-Scenario

	# of Tasks	Percentage Completion to Standard	Base Training Readiness Level	Inhibited Activities	Encroachment Factors
All Tasks	**46**	**34%**	B-4 Not Combat Capable	Off-Road Maneuvers Digging	
Field Tasks	**46**	**34%**	B-4 Not Combat Capable		
Non-Firing Tasks	**29**	**54%**	B-4 Not Combat Capable		

Battalion Landing Team

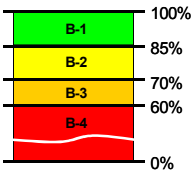
Training Tasks: In-Scenario

	# of Tasks	Percentage Completion to Standard	Base Training Readiness Level	Inhibited Activities	Encroachment Factors
All Tasks	**179**	**69.6%**	B-3 Combat Capable (low threat)	Off-Road Maneuvers Digging External Helo Loads over I-5 Opposition Force	
Field Tasks	**157**	**65.4%**	B-3 Combat Capable (low threat)		
Non-Firing Tasks	**147**	**67.8%**	B-3 Combat Capable (low threat)		

USMC Readiness Categories

- 10 – Fully Combat Qualified
- 8.5-9.9 Combat Qualified (high threat)
- 7.0-8.4 Combat Ready (medium threat)
- 6.0-6.9 Combat Capable (low threat)
- < 6.0 Not Combat Capable

Base Training Readiness Percentage Thresholds for each B-Level



Encroachment Factors Key

- Air Quality
- Cultural Resources
- Ecosystem/Biodiversity
- Endangered Species
- Maritime
- Water Use
- Wetlands
- Airborne Noise
- Airspace Restrictions
- Frequency Encroachment
- Land Use
- Urban Growth
- UXO and Constituents
- Public Safety
- Not Applicable (Admin. Tasks)

Battalion Landing Team: Phase I

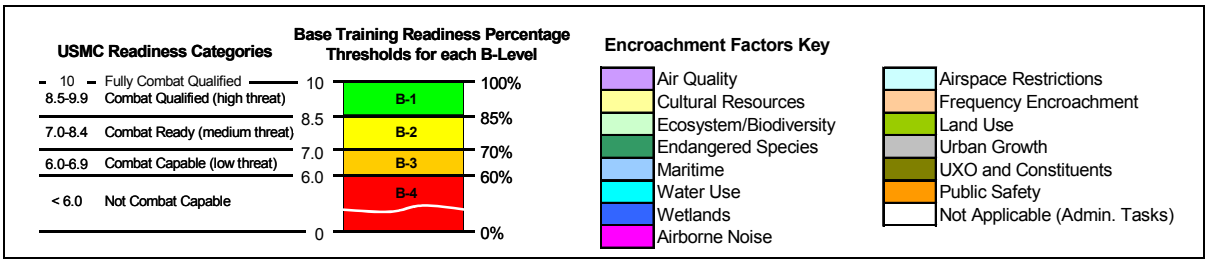
Training Tasks: In-Scenario

	# of Tasks	Percentage Completion to Standard	Base Training Readiness Level	Inhibited Activities	Encroachment Factors
All Tasks	**48**	**72%**	B-2 Combat Ready (medium threat)	Off-Road Maneuvers Digging Airspace Use Noise	
Field Tasks	**39**	**65%**	B-3 Combat Capable (low threat)		
Non-Firing Tasks	**34**	**73%**	T-2 Combat Ready (medium threat)		

Battalion Landing Team: Phase II

Training Tasks: In-Scenario

	# of Tasks	Percentage Completion to Standard	Base Training Readiness Level	Inhibited Activities	Encroachment Factors
All Tasks	**26**	**64%**	T-3 Combat Capable (low threat)	Off-Road Maneuvers Digging Airspace Use Noise	
Field Tasks	**25**	**62%**	T-3 Combat Capable (low threat)		
Non-Firing Tasks	**23**	**64%**	T-3 Combat Capable (low threat)		



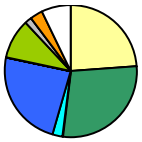
Battalion Landing Team: Phase III

Training Tasks: In-Scenario

	# of Tasks	Percentage Completion to Standard	Base Training Readiness Level	Inhibited Activities	Encroachment Factors
All Tasks	**38**	**78%**	T-2 Combat Ready (medium threat)	Off-Road Maneuvers Digging Airspace Use Noise	
Field Tasks	**35**	**77%**	T-2 Combat Ready (medium threat)		
Non-Firing Tasks	**32**	**80%**	T-2 Combat Ready (medium threat)		

Battalion Landing Team: Phase IV

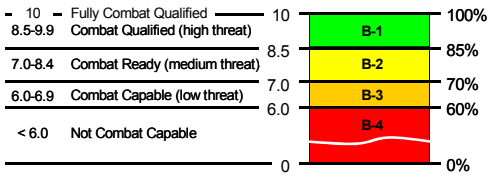
Training Tasks: In-Scenario

	# of Tasks	Percentage Completion to Standard	Base Training Readiness Level	Inhibited Activities	Encroachment Factors
All Tasks	**67**	**67%**	T-3 Combat Capable (low threat)	Off-Road Maneuvers Digging Airspace Use Noise	
Field Tasks	**58**	**62%**	T-3 Combat Capable (low threat)		
Non-Firing Tasks	**58**	**62%**	T-3 Combat Capable (low threat)		

USMC Readiness Categories

10	Fully Combat Qualified
8.5-9.9	Combat Qualified (high threat)
7.0-8.4	Combat Ready (medium threat)
6.0-6.9	Combat Capable (low threat)
< 6.0	Not Combat Capable

Base Training Readiness Percentage Thresholds for each B-Level



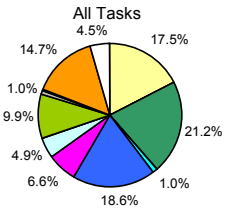
Encroachment Factors Key

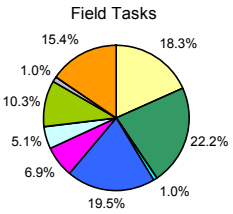
- Air Quality
- Cultural Resources
- Ecosystem/Biodiversity
- Endangered Species
- Maritime
- Water Use
- Wetlands
- Airborne Noise
- Airspace Restrictions
- Frequency Encroachment
- Land Use
- Urban Growth
- UXO and Constituents
- Public Safety
- Not Applicable (Admin. Tasks)

Encroachment Factor Summary

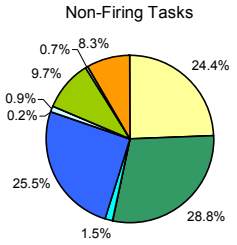
Training Tasks: In-Scenario

All/Field Tasks	Environmental							Manmade									
	Air Quality	Cultural Resources	Ecosystem/Biodiversity	Endangered Species	Maritime	Water Use	Wetlands	Airborne Noise	Airspace Restrictions	Frequency Encroachment	Land Use	Urban Growth	UXO and Constituents	Public Safety	Training Safety	Total Safety	Not Applicable
AH-1W COBRA								8	8					17	17	17	38
AAV Crewman	1	7		9		5	7	2			6	2		7	1	7	53
Combat Engineer	1	8		14			7				8			7	1	8	36
Mortar Man		18		19			18		13		2	13		14	13	14	27
Rifle Company		37		40		2	37	1	2		16			11	2	12	5
Artillery Battery		9		14		3	5	24	25		1	1	1	26	30	33	6
LAR		24		36			36	15			23			17	15	17	0
Battalion Landing Team		75		81		3	74	2	5		37	5		18	23	41	22
Totals		108		131		6	115	41	30		61	6	1	61	68	91	28





Non-Firing Tasks	Environmental							Manmade								
	Air Quality	Cultural Resources	Ecosystem/Biodiversity	Endangered Species	Maritime	Water Use	Wetlands	Airborne Noise	Airspace Restrictions	Frequency Encroachment	Land Use	Urban Growth	UXO and Constituents	Public Safety	Training Safety	Total Safety
AH-1W COBRA								8	8							
AAV Crewman	1	6		6		5	6					1		1		1
Combat Engineer		7		7			6				1				1	1
Mortar Man		5		6			5				2			1		1
Rifle Company		32		34		2	32				11			4		4
Artillery Battery		9		13		3	5		1		1	1		3	3	6
LAR		9		21			21				8			2		2
Battalion Landing Team		71		76		3	70	1	4		30	3		11	20	31
Totals		133		157		8	139	1	5		53	4		21	24	45

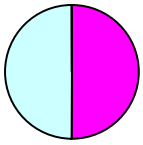
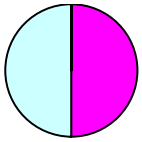


Appendix F

Base-wide
Detailed Data Summaries

AH-1W COBRA

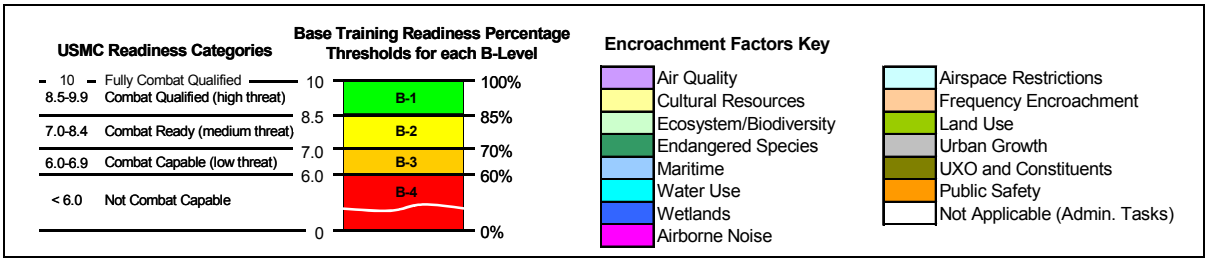
Training Tasks: Base-wide

	# of Tasks	Percentage Completion to Standard	Base Training Readiness Level	Inhibited Activities	Encroachment Factors
All Tasks	**105**	**98%**	B-1 Combat Qualified (high threat)	Airspace Use Noise	
Field Tasks	**67**	**97%**	B-1 Combat Qualified (high threat)		
Non-Firing Tasks	**49**	**97%**	B-1 Combat Qualified (high threat)		

AAV Crewman

Training Tasks: Base-wide

	# of Tasks	Percentage Completion to Standard	Base Training Readiness Level	Inhibited Activities	Encroachment Factors
All Tasks	**117**	**94%**	B-1 Combat Qualified (high threat)	Off-Road Maneuvers Digging Water Use Noise	
Field Tasks	**64**	**88%**	B-1 Combat Qualified (high threat)		
Non-Firing Tasks	**58**	**94%**	B-1 Combat Qualified (high threat)		



Combat Engineer (MOS 1371)

Training Tasks: Base-wide

	# of Tasks	Percentage Completion to Standard	Base Training Readiness Level	Inhibited Activities	Encroachment Factors
All Tasks	**91**	**92%**	B-1 Combat Qualified (high threat)	Grading Camouflage Off-Road Maneuvers Digging	
Field Tasks	**55**	**85%**	B-1 Combat Qualified (high threat)		
Non-Firing/ Non Demolition Tasks	**37**	**80%**	B-2 Combat Ready (medium threat)		

Mortar Man (MOS 0341)

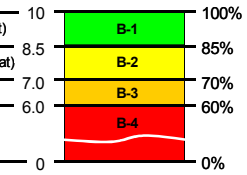
Training Tasks: Base-wide

	# of Tasks	Percentage Completion to Standard	Base Training Readiness Level	Inhibited Activities	Encroachment Factors
All Tasks	**53**	**93%**	B-1 Combat Qualified (high threat)	Digging Airspace Use	
Field Tasks	**26**	**85%**	B-1 Combat Qualified (high threat)		
Non-Firing Tasks	**13**	**92%**	B-1 Combat Qualified (high threat)		

USMC Readiness Categories

10	Fully Combat Qualified
8.5-9.9	Combat Qualified (high threat)
7.0-8.4	Combat Ready (medium threat)
6.0-6.9	Combat Capable (low threat)
< 6.0	Not Combat Capable

Base Training Readiness Percentage Thresholds for each B-Level

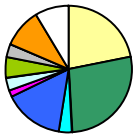


Encroachment Factors Key

- Air Quality
- Cultural Resources
- Ecosystem/Biodiversity
- Endangered Species
- Maritime
- Water Use
- Wetlands
- Airborne Noise
- Airspace Restrictions
- Frequency Encroachment
- Land Use
- Urban Growth
- UXO and Constituents
- Public Safety
- Not Applicable (Admin. Tasks)

Rifle Company

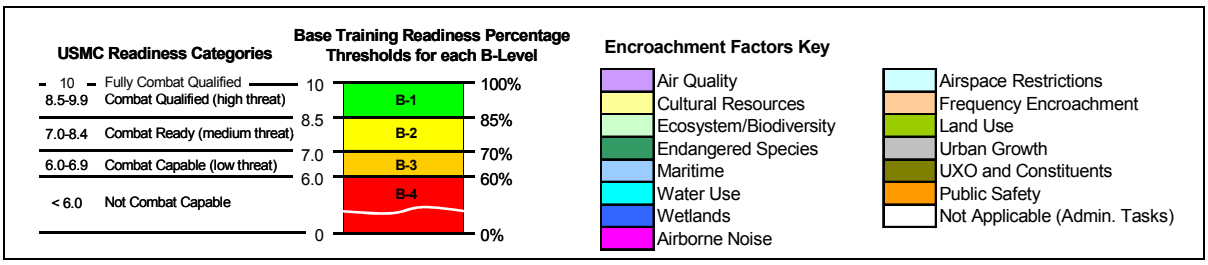
Training Tasks: Base-wide

	# of Tasks	Percentage Completion to Standard	Base Training Readiness Level	Inhibited Activities	Encroachment Factors
All Tasks	**77**	**90%**	B-1 Combat Qualified (high threat)	Off-Road Maneuvers Digging Smoke	
Field Tasks	**72**	**89%**	B-1 Combat Qualified (high threat)		
Non-Firing Tasks	**64**	**90%**	B-1 Combat Qualified (high threat)		

Artillery Battery

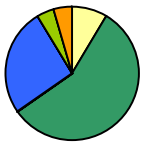
Training Tasks: Base-wide

	# of Tasks	Percentage Completion to Standard	Base Training Readiness Level	Inhibited Activities	Encroachment Factors
All Tasks	**71**	**80%**	B-2 Combat Ready (medium threat)	Off-Road Maneuvers Digging Airspace Use Noise	
Field Tasks	**65**	**78%**	B-2 Combat Ready (medium threat)		
Non-Firing Tasks	**38**	**84%**	B-1 Combat Ready (medium threat)		



LAR Platoon

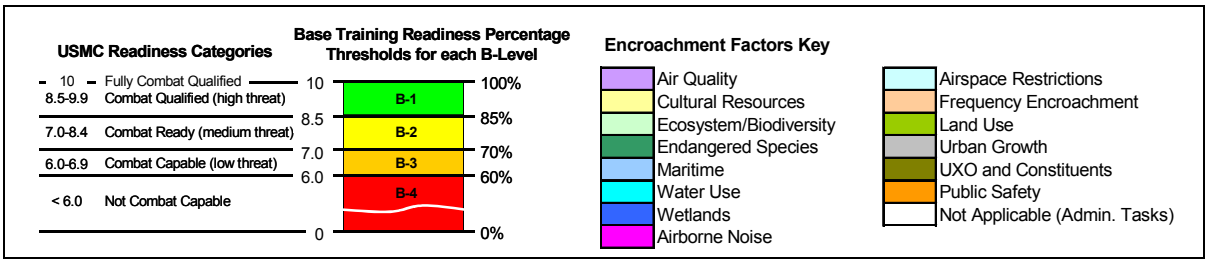
Training Tasks: Base-wide

	# of Tasks	Percentage Completion to Standard	Base Training Readiness Level	Inhibited Activities	Encroachment Factors
All Tasks	**46**	**75%**	**B-2** Combat Ready (medium threat)	Off-Road Maneuvers Digging	
Field Tasks	**46**	**75%**	**B-2** Combat Ready (medium threat)		
Non-Firing Tasks	**29**	**77%**	**B-2** Combat Ready (medium threat)		

Battalion Landing Team

Training Tasks: Base-wide

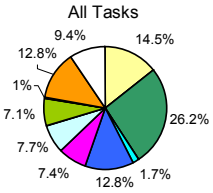
	# of Tasks	Percentage Completion to Standard	Base Training Readiness Level	Inhibited Activities	Encroachment Factors
All Tasks	**179**	**88.0%**	**B-1** Combat Qualified (high threat)	Off-Road Maneuvers Digging Airspace Use Noise	
Field Tasks	**157**	**86.3%**	**B-1** Combat Qualified (high threat)		
Non-Firing Tasks	**147**	**88.5%**	**B-1** Combat Qualified (high threat)		

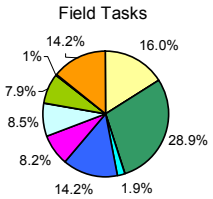


Encroachment Factor Summary

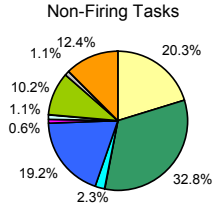
Training Tasks: Base-wide

	Environmental							Manmade									
All/Field Tasks	Air Quality	Cultural Resources	Ecosystem/Biodiversity	Endangered Species	Maritime	Water Use	Wetlands	Airborne Noise	Airspace Restrictions	Frequency Encroachment	Land Use	Urban Growth	UXO and Constituents	Public Safety	Training Safety	Total Safety	Not Applicable
AH-1W COBRA								8	8								38
AAV Crewman	1	5		6			3	2			1	3	1	6	1	6	53
Combat Engineer	1	11		11			8				3			2	1	3	36
Mortar Man		3		6			3					2		1	2	3	27
Rifle Company		13		16		2	9	1	2		3	2		1	5	6	5
Artillery Battery		8		14		3	3	23	23		2	1	1	2	13	14	6
LAR		4		26			12				2				2	2	0
Battalion Landing Team		26		36		1	21	2	2		18	3		9	14	23	22
Totals		51		92		6	45	26	27		25		1	12	34	45	33





	Environmental							Manmade								
Non-Firing Tasks	Air Quality	Cultural Resources	Ecosystem/Biodiversity	Endangered Species	Maritime	Water Use	Wetlands	Airborne Noise	Airspace Restrictions	Frequency Encroachment	Land Use	Urban Growth	UXO and Constituents	Public Safety	Training Safety	Total Safety
AH-1W COBRA								8	8							
AAV Crewman	1	5		5			3					1		1		1
Combat Engineer		9		9			8				1				1	1
Mortar Man		3		4			3					2		1		1
Rifle Company		12		15		2	8				3	2		1		1
Artillery Battery		8		13		3	3				2	1		1	4	5
LAR		4		13			12				2					
Battalion Landing Team		24		32		1	19	1	2		14	1		6	11	17
Totals		36		58		4	34	1	2		18	2		7	15	22



Appendix G

Notional Enemy Defensive Positions For a Defended Red Beach

Figure G-1. Notional Enemy Defensive Positions For a Defended Red Beach